American Indian and Alaska Native Mental Health Research

Volume 25, Issue 2, 2018

Centers for American Indian &
Alaska Native Health
colorado school of public health

American Indian and Alaska Native Mental Health Research

Volume 25, Number 2, 2018

Editor-in-Chief
Spero M. Manson, PhD

Journal Manager
Sara Mumby

ISSN 1533-7731

Aurora, Colorado

CHARACTERISTICS OF SUBSTANCE USE AND SELF-INJURY AMONG AMERICAN INDIAN ADOLESCENTS WHO HAVE ENGAGED IN BINGE DRINKING

Mary F. Cwik, PhD[1], Summer Rosenstock, PhD[1], Lauren Tingey, PhD[1], Novalene Goklish, MS[1,2], Francene Larzelere, MS[1,2], Rosemarie Suttle[1,2], Emily Haroz, PhD[1,3], Kyle Hill, PhD[1], Mariddie Craig[2], and Allison Barlow, PhD[1]

Abstract: Binge drinking appears to be a risk factor, facilitator, and method of suicidal and non-suicidal self-injury for some American Indian (AI) youth. We examined characteristics, patterns, and motivations for binge use among AI adolescents (N = 69; 10-19 years-old) who recently engaged in binge drinking. The majority used alcohol alone (53.7%) or a combination of alcohol and marijuana (31.3%) for their binge event. Gender differences emerged with boys more severely affected than girls. Forty-seven percent reported lifetime suicidal thoughts. This study represents one of the first in-depth examinations of substance use and related behaviors among AI adolescents who have engaged in recent binge use.

INTRODUCTION

Many American Indian (AI) youth and adults abstain from alcohol use (Pemberton, Colliver, Robbins, & Gfroerer, 2008; Whitesell et al., 2014), yet binge drinking is still a serious public health problem. Binge drinking is associated with injury, alcohol poisoning, cirrhosis, alcohol abuse and dependence, and even brain changes (Miller, Naimi, Brewer, & Jones, 2007; Spear, 2000). Studies have indicated higher binge drinking rates for AIs compared with other racial/ethnic groups, and this phenomenon has persisted in the most recent large national surveys of cross-racial alcohol/drug use (Chen, Balan, & Price, 2012; Miller, Stanley, & Beauvais, 2012; Stanley, Harness, Swaim, & Beauvais, 2014; Walls, Sittner Hartshorn, & Whitbeck, 2013; Whitbeck & Armenta, 2015). Forty-seven percent of AI adolescents (compared to 35.5% of non-Native adolescents) report past 30-day heavy episodic use (Chen et al., 2012). AI youth are also

---

[1] Center for American Indian Health, Johns Hopkins Bloomberg School of Public Health
[2] White Mountain Apache Tribe
[3] Department of Mental Health, Johns Hopkins Bloomberg School of Public Health

more likely to start using alcohol and other substances at an earlier age and use more frequently than non-Native youth (Friese, Grube, Seninger, Paschall, & Moore, 2011; Whitesell et al., 2007).

The odds of alcohol misuse more than double each year between ages 10 and 15 for AI youth (Walls et al., 2013). Previously identified alcohol misuse behaviors were concentrated among AI boys (Friese et al., 2011); however, in recent years, AI girls appear to be drinking earlier and are increasingly affected (Cheadle & Whitbeck, 2011; Heavyrunner-Rioux & Hollist, 2010; Walls et al., 2013; Whitesell et al., 2014). However, an often overlooked strength in AI communities is the high rate of alcohol abstinence among adolescents. Given abstinence rates range from 60%-70% (Pemberton et al., 2008; Whitesell et al., 2014), it may be that there is less drinking overall, but the type of drinking (i.e., amount and consequences) is more severe in AI adolescents compared to non-Native adolescents.

For the sub-group of AI adolescents who engage in alcohol misuse, these behaviors are likely to extend into early adulthood, lead to substance use disorders (SUDs), and impact other behavioral and mental health domains (Friese et al., 2011; Whitbeck et al., 2014; Whitesell et al., 2007). A prospective, longitudinal trial with approximately 600 AI adolescents over 8 years from a single culture in the Northern U.S. gives the most definitive information regarding early development of substance use risk and comorbidity. AI adolescents who initiated alcohol use between 11 and 13 years were at 5-9 times greater risk for alcohol misuse in later adolescence (Cheadle & Whitbeck, 2011). Over half (58.2%) had a mental or substance use disorder in their lifetime, and 37.2% had two or more disorders in young adulthood (Cheadle & Whitbeck, 2011). Gender differences also appear to persist across developmental stages—for adolescents with a past year SUD, boys were more likely to meet Conduct Disorder criteria (30.9% vs. 17.7%), while girls were more likely to meet Major Depressive Disorder criteria (12.8% vs. 6.2%) in young adulthood (Whitbeck et al., 2014).

However, there remain gaps in knowledge about the contextual factors that precipitate binge drinking among AI youth, such as how binge drinking episodes function as an internal or external response to personal or environmental factors or social norms, and, more broadly, how the community seeks to understand and address these behaviors. Due to known regional differences and the importance of community engagement, new understanding can be generated by tribal-specific approaches.

The White Mountain Apache Tribe applied an innovative approach to identify the scope of binge drinking in their community. It was designed as an extension from their community-wide mandated surveillance system for suicide (Cwik et al., 2014; Mullany et al., 2009). The locally named “Celebrating Life Suicide Surveillance System” was developed in 2001 to track individuals reported for suicide ideation, attempts, and deaths as well as provide follow-up and case management for at-risk individuals (or their family members and peers in the case of a death) by trusted Apache community mental health workers. Through tribal initiation, the surveillance system grew to include non-suicidal self-injury in 2006. In 2010, the community identified binge-drinking on the spectrum of self-injury (Barlow et al., 2012) and included it in the system. Binge drinking came to the attention of the surveillance system because a number of events that were reported as suicide attempts (i.e., alcohol overdose) were identified as binge drinking upon in-person follow-up. In addition, it was discovered the co-occurrence of suicidal behavior and substance use among AI youth ages 15-24 was high, especially among boys (64% of youth were “drunk or high” at the time of suicide death; 75.7% during suicide attempt; and 49.4% during suicidal ideation; Barlow et al., 2012). Therefore, Apache stakeholders decided to conceptualize and prioritize binge drinking as a reportable (non-suicidal) self-injurious behavior.

The current study is the first step to understand the context, function, and consequences of binge drinking among Apache adolescents. The purpose of this paper is to examine the characteristics, patterns, and motivations for binge alcohol use among a sample of reservation based-adolescents who recently engaged in binge drinking. Unique, community driven aspects of the study design include identification via the surveillance system; implementation of assessments by Apache Research Assistants (RAs) in youth’s homes or other private, safe places; and collection of data close in time to the binge event. The goal of the study was to explore participants’: 1) substance use history and context for binge drinking behavior; 2) reasons for engaging in binge drinking; and 3) associated high risk behaviors, specifically suicide and non-suicidal self-injury, in order to inform early identification of at-risk youth and design prevention and intervention programs.

METHODS

Design

We used a cross sectional design with 68 AI youth who engaged in a recent binge episode identified by the Celebrating Life Suicide Surveillance System. The study represented a tribal-academic partnership between the White Mountain Apache Tribe (WMAT) and the Johns

Hopkins (JHU) Center for American Indian Health. The Community Advisory Board, comprised of key tribal stakeholders (e.g., youth, elders, traditional healers, parents, and community agency representatives), provided guidance on all aspects of the study design including measures for cultural acceptability, relevance, and language. The study was approved by the WMAT Tribal Council and Health Advisory Board and the JHU IRB; the manuscript was approved by the WMAT Tribal Council and Health Advisory Board.

Eligibility Criteria

Participants were ages 10-19, residents of the WMAT Indian Reservation, and engaged in binge substance use documented by the Celebrating Life Suicide Surveillance System within 90 days prior to the assessment. Drinking that resulted in serious consequences, such as losing consciousness and/or required medical attention for complications associated with a high Blood Alcohol Count (BAC), were coded as binge by the hospital (one of the referral sources for the surveillance system) and used as eligibility criteria for recruitment.

Registration in the Celebrating Life Suicide Surveillance System

The procedures for the Celebrating Life Suicide Surveillance System have been reported in detail elsewhere (Cwik et al., 2014). Briefly, Celebrating Life staff conducts regular in-service trainings at community gatherings, local schools, the police department, Indian Health Services facilities, and for local first responders. During in-service trainings, participants are provided with referral forms as well as instructed on which behaviors are reportable modeled on the Columbia Classification Algorithm for Suicide Assessment (C-CASA; Posner, Oquendo, Gould, Stanley, & Davies, 2007). The surveillance system functions as follows: 1) initial report on an individual made to Celebrating Life staff; 2) Celebrating Life staff conducts a follow-up visit with the individual; 3) Celebrating Life staff reviews all available information from intake and follow-up visit, consults with Apache Technical Assistance team, and reaches consensus on final coding of event; and 4) Celebrating Life staff refers individual to appropriate services (Cwik et al., 2014).

Recruitment and Consent

When Celebrating Life staff encountered and verified a binge drinking case, they asked youth and families for their permission to refer them to RAs who later followed up to describe the study and obtain voluntary assent/consent. Parent/guardian consent and youth assent were obtained for participants <18 years of age; consent was obtained directly for participants ≥ 18 years of age.

Data Collection

Participants completed a one-time assessment at their home or a private location of their choice and used an Audio Computer Assisted Self-Interview (ACASI). Participants used headphones, and a recorded voice read the questions aloud. The assessment collected information across several domains, including socio-demographics, substance use, related high risk behaviors such as suicide and self-injury, and other psychosocial indicators. ACASI was used to collect data because in previous studies in the WMAT and other AI populations, it was found that self-reporting of sensitive behaviors was more reliable when ACASI technologies were used compared to pencil and paper self- or interviewer-administered questionnaires (Mullany et al., 2013; Vereecken & Maes, 2006). The audio-based technology also overcomes low literacy as a barrier to survey response. Participants received a $75 gift card after completion of the assessment battery.

Measures

The WMAT-JHU study team employed the following measures to describe the socio-demographic characteristics, current and past substance use, and suicidal and non-suicidal self-injurious behaviors of participants.

Demographics

A structured interview, designed by the study team and used in past studies with the WMAT tribe, collected information on age; socioeconomic, educational, and employment status; living situation; marital/partner status; and home environment.

Alcohol and Drug Use

Items were combined from the Youth Risk Behavior Survey, Voices of Indian Teens Survey, and Montana Meth Project with proven validity and reliability in this and other AI populations.

Self-Injurious Thoughts and Behaviors Interview (SITBI)

The SITBI is a brief structured interview that evaluates the presence, frequency, and characteristics of a wide range of suicidal and non-suicidal self-injurious thoughts and behaviors.

We modified the interview to ask participants these questions about their binge alcohol use. The original instrument has strong inter-rater (κ = .99) and test-retest reliability (κ = .70), as well as concurrent validity (κ = .54) in other populations (Nock, Holmberg, Photos, & Michel, 2007); the psychometrics with AIs or the modified version have yet to be tested.

Analyses

Scales and indices were scored according to standardized manuals. All analyses presented in this paper are descriptive in nature. Cross tabulations (categorical data), means, and medians (continuous data) were calculated to explore demographic characteristics among those who partook in binge alcohol or drug use, along with patterns and reasons for use. These variables were also compared by gender to determine whether there were differences between boys and girls using Chi-Square testing (categorical variables), Fisher-exact tests (categorical variables with small cell sizes), *t*-tests (continuous, normally distributed variables), and median tests (continuous, skewed variables). Two-tailed statistical significance was set at $p < 0.05$. As this was an exploratory study, we did not adjust our *p*-value for multiple comparisons.

RESULTS

Demographic Characteristics of Study Participants (Table 1)

A total of 72 individuals were identified in the surveillance system with a verified a binge drinking incident. Of these 72, 68 youth enrolled in the study, including 38 boys (55.9%) and 30 girls (44.1%). Mean age at enrollment was 16.44 years (*SD* = 1.96); boy participants (16.97 years, *SD* = 1.81) were about 1 year older than girls (15.77 years, *SD* = 1.96; $p = 0.0105$). The majority spoke only English at home (61.8%). Almost two-thirds (63.2%) reported living with both their mother and father, about one-third (32.4%) reported living in a multi-generational home, and the average number of individuals living in the home was 5.78 (*SD* = 2.74). Twenty-three percent of boys reported living with neither parent, while 23% of girls reported living with their mother alone. Nearly half of participants (47.1%) also reported living in more than one home in the past year. Almost two-thirds (64.7%) of the sample were currently enrolled in school.

Table 1
Baseline Characteristics of Study Participants with History of Binging (Alcohol or Drug Use)

N = 68	**Total**	**Boys**	**Girls**	***P*-value**
Number of Participants	68 (100.0%)	38 (55.9%)	30 (44.1%)	-------
Mean Age (*SD*)	16.44 (1.96)	16.97 (1.81)	15.77 (1.96)	0.011
Language Spoken at Home n(%)[a]:				
Navajo	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Apache	10 (14.7%)	6 (15.8%)	4 (14.3%)	
English	42 (61.8%)	23 (60.5%)	19 (63.3%)	
Native and English	15 (22.1%)	9 (23.7%)	6 (20.0%)	0.939
Lived in more than 1 home in the last year n(%)	32 (47.1%)	21 (55.3%)	11 (36.7%)	0.127
Number of people living in the home Mean(*SD*)	5.78 (2.74)	5.63 (2.83)	5.97 (2.66)	0.620
Household Items n(%)[b]:				
Air Conditioning	25 (36.8%)	17 (44.7%)	8 (26.7%)	0.179
Satellite Dish	41 (60.3%)	23 (60.5%)	18 (60.0%)	0.659
Car/Truck	53 (77.9%)	28 (73.7%)	25 (83.3%)	0.499
Motorcycle/ATV	3 (4.5%)	0 (0.0%)	3 (10.0%)	0.085
Computer	25 (36.8%)	12 (31.6%)	13 (43.3%)	0.439
Currently in enrolled school n(%)	44 (64.7%)	24 (63.2%)	20 (66.7%)	0.764
Reported living with n(%):				
Neither parent	12 (17.7%)	9 (23.7%)	3 (10.0%)	
Mother only	12 (17.7%)	5 (13.2%)	7 (23.3%)	
Father only	1 (1.5%)	1 (2.6%)	0 (0.0%)	
Mother and Father	43 (63.2%)	23 (60.5%)	20 (66.7%)	0.289
Living in a multigenerational household n(%)	22 (32.4%)	13 (34.2%)	9 (30.0%)	0.712

[a] One missing value
[b] One participant refused to answer these questions

History of Suicide and Non-Suicidal Self-Injury (Table 2)

Almost half of the sample (47.1%) reported having suicidal thoughts at some point in their lifetime, but a smaller proportion reported ever making a plan (17.6%), attempting suicide (14.7%), or engaging in non-suicidal self-injury (16.9%). Girls were more likely to have reported suicidal thoughts than boys ($p = 0.017$). For participants endorsing these behaviors, the median starting ages were 14.00 years old for ideation (*IQR* = 3.00), 14.50 years old for plan (*IQR* = 3.50), and 15.00 years old for both an attempt and non-suicidal self-injury (*IQRs* = 4.00).

Alcohol, Marijuana and Other Drug Use

Binge Event

The majority of the sample (53.7%) used alcohol only during their last binge event, followed by alcohol and marijuana together (31.3%). Boys were more likely than girls to use alcohol and marijuana together (43.2% vs. 16.7%, $p = 0.006$; see Table 3). Binge use happened most frequently between 6pm-12am (54.69%), followed by 12pm-6pm (20.32%), 6am-12pm (15.62%), and 12am-6am (9.37%). Regarding severity, more boys than girls reported that the event had greater potential lethal consequences (e.g., alcohol poisoning, death) on a Likert scale (5.06 vs. 3.34/10-point scale; $p = 0.0173$). Thirty-three percent of boys also reported consequences for being found passed out compared to only 17.86% of girls; and 31.6% of boys reported receiving medical treatment compared to 17.8% of girls.

Table 2
History of Suicide and Non-Suicidal Self-Injury

***N* = 68**	**Total**	**Boys**	**Girls**	**P-value**
Number of times had thoughts of killing self (lifetime) n (%)				
Never	36(52.9%)	24(63.2%)	12(40.0%)	
1-5 times	26(38.2%)	9 (23.7%)	17(56.7%)	
5+ times	6 (8.8%)	5 (13.2%)	1 (3.3%)	0.017
Age first suicidal thought[a]				
Median (IQR)	14.00(11-17)	15.00(12.5-17.5)	13.50(10.5-16.5)	
Range	4.00-18.00	4.00-18.00	10.00-18.00	0.175
Number of times made plan to kill self (lifetime)				
Never	56(82.4%)	33(86.8%)	23(76.7%)	
1-5 times	12(17.7%)	5 (13.2%)	7(23.3%)	
5+ times	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.274
Age first suicide plan[b]				
Median (IQR)	14.50(11-18)	15.00(13-17)	14.00(11-17)	
Range	12.00-18.00	13.00-18.00	12.00-18.00	0.242
Number suicide attempts in lifetime				
Never	58(85.3%)	32(84.2%)	26(86.7%)	
1-5 times	8(11.8%)	5(13.2%)	3(10.0%)	
5+ times	2 (2.9%)	1 (2.6%)	1 (3.3%)	1.000
Age first suicide attempt[c]				
Median (IQR)	15.00(11-19)	15.00(11-19)	14.00(10-18)	
Range	12.00-18.00	12.00-18.00	12.00-16.00	0.895
Number times engaged in NSSI (lifetime)[d]				
Never	54(83.1%)	32(88.9%)	22(75.9%)	
1-5 times	6 (9.2%)	3 (8.3%)	3(10.3%)	
5+ times	5 (7.7%)	1 (2.8%)	4(13.8%)	0.222
Age first NSSI [2]				
Median (IQR)	15.00(11-19)	16.00(13-19)	13.00(10-16)	
Range	6.00-18.00	6.00-18.00	10.00-16.00	0.301

[a] 34 values missing for Age first suicidal thought: 22 boys, 12 girls
[b] 56 values missing for Age first suicide plan and Age first NSSI: 33 boys, 23 girls
[c] 58 values missing for Age first suicide attempt: 32 boys, 26 girls
[d] 3 values missing for Number times engaged in NSSI (lifetime): 2 boys, 1 girl

Age at First Use (Table 3)

The median age at first alcohol use was 13.00 (*IQR* = 10.00-16.00), with a wide range for initiation and young-starting age (6-19 years old). The median age for first binge was 14.00 years (*IQR* = 12.00-16.00, range: 7.00-19.00), and drinking regularly was 15.00 years (*IQR* = 13.00-17.00, range: 9.00-18.00). Marijuana use also started early: median age of first use was 13.00 (*IQR* = 9.50-16.50, range: 5.00-18.00).

Frequency of Use (Table 3)

In their lifetime, the median number of times binging was 10 for boys and 5 for girls with more boys reporting binge use above the overall median than girls (p = 0.035). In the past year, the median number of times binging was 5 for boys and 2 for girls with more boys, again, endorsing binge use above the overall median than girls (p = 0.014). Almost half of the overall sample (47.8%) did not use alcohol in the past month. For more detailed information about frequency, see Table 3.

Illicit Drug Use (Table 3)

Overall marijuana use was high and frequent, with 88.2% of the overall sample reporting they had used marijuana in their lifetime. Gender differences emerged for use in the past 6 months (p = 0.006). For marijuana use in the past 6 months, 57% of girls compared to 18.4% of boys reported 0 days, whereas 13.3% of girls versus 44.7% of boys reported 2-7 days. Similarly, 30.4% of boys compared to 17.4% of girls reported using marijuana 8 or more days in the past month. Smaller percentages of youth had tried other illegal drugs (25.37% crack, cocaine, or heroin; 19.12% inhalants; and 16.42% methamphetamine).

Reasons for Engaging in Binge Substance Use (Table 4)

Youth were asked to endorse potential reasons for engaging in their most recent binge drinking episode (*multiple responses possible*). The most frequently endorsed specific item was “stress/lot on mind” (32.3%). The next most frequent responses were interpersonal: “family problems” (27.7%), “fight with boy/girlfriend” (18.5%), and “peer pressure/copying” (18.5%). However, large proportions of the sample reported “can’t remember” (40.2%) and “no reason in particular” (18.5%). Youth were also asked to describe where they got the idea for their last binge event (*multiple responses possible)* and overwhelmingly reported their friends (73.5%), followed by acquaintance (29.4%), family (27.9%), and TV/music (26.5%). There were no differences between genders in reported reasons for engaging in binge drinking; however, girls were more likely to report getting the idea from the internet compared to boys ($p = 0.018$).

Table 3
Alcohol, Marijuana, and Other Drug Use

	Total *N* = 68	**Boys** *n* = 38	**Girls** *n* = 30	***P*-value**
Age First Use				
Age at first drink:[a]				
Median (IQR)	13.00(10-16)	13.50(10.5-16.5)	13.00(11-15)	
Range	6.00-19.00	6.00-19.00	6.00-17.00	0.770
Age started drinking alcohol regularly:[b]				
Median (IQR)	15.00(13-17)	16.00(14-18)	15.00(13-17)	
Range	9.00-18.00	9.00-18.00	13.00-17.00	0.314
Age at first binge:[c]				
Median (IQR)	14.00(12-16)	14.00(12-16)	13.50(11.5-15.5)	
Range	7.00-19.00	7.00-19.00	9.00-17.00	0.469
Ever used marijuana % (n)	88.2%(60)	92.1%(35)	83.3%(25)	0.265
Age of first marijuana use:[d]				
Median (IQR)	13.00(9.5-16.5)	13.00(9-17)	14.00(11-17)	
Range	5.00-18.00	5.00-17.00	8.00-18.00	0.458
Multi-Drug Use				
Substances used during last binge % (n)[e]				
Alcohol only	53.7%(36)	35.1%(13)	76.7%(23)	
Marijuana only	6.0% (4)	8.1% (3)	3.3% (1)	
Alcohol and marijuana	31.3%(21)	43.2%(16)	16.7% (5)	
Cocaine + alcohol, marijuana or both	4.5% (3)	8.1% (3)	0.0% 0)	
Other combinations	4.5% (3)	5.4% (2)	3.3% (1)	0.006
Frequency of Use				
Number of days used alcohol: Past Month % (n)[e]				
Never	47.8%(32)	43.2%(16)	53.3%(16)	
1 day	23.9%(16)	21.6% (8)	26.7% (8)	
2-7 days	22.4%(15)	29.7%(11)	13.3% (4)	
8-14 days	6.0% (4)	5.4% (2)	6.7% (2)	
15+ days	0.0% (0)	0.0% (0)	0.0% (0)	0.450
Number of times intoxicated: Past 6 Months %(n)[f]				
Never	28.8%(19)	24.3% (9)	34.5%(10)	
1 time	30.3%(20)	29.7%(11)	31.0% (9)	
2-7 times	30.3%(20)	32.4%(12)	27.6% (8)	
8-14 times	6.1% (4)	10.8% (4)	0.0% (0)	
15+ times	4.6% (3)	2.7% (1)	6.9% (2)	0.362
Number of times intoxicated: Past Month %(n)				
Never	61.8%(42)	52.6%(20)	73.3%(22)	
1 time	19.1%(13)	23.7% (9)	13.3% (4)	
2-7 times	16.2%(11)	18.4% (7)	13.3% (4)	
8-14 times	1.5% (1)	2.6% (1)	0.0% (0)	
15+ times	1.5% (1)	2.6% (1)	0.0% (0)	0.402

continued on next page

Table 3 Continued
Alcohol, Marijuana, and Other Drug Use

	Total *N* = 68	**Boys** *n* = 38	**Girls** *n* = 30	***P*-value**
Number of times engaged in binge drinking or drug use: Lifetime %(n)[g]				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	16.0% (8)	15.4% (4)	16.7% (4)	
2-7 times	42.0%(21)	26.9% (7)	58.3%(14)	
8-14 times	20.0%(10)	26.9% (7)	12.5% (3)	
15+ times	22.0%(11)	30.8% (8)	12.5% (3)	0.111
Number of times engaged in binge drinking or drug use: Past Year %(n)[h]				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	24.5%(12)	20.0% (5)	29.2% (7)	
2-7 times	44.9%(22)	40.0%(10)	50.0%(12)	
8-14 times	20.4%(10)	24.0% (6)	16.7% (4)	
15+ times	10.2% (5)	16.0% (4)	4.2% (1)	0.484
Number of times engaged in binge drinking or drug use: Past Month %(n)[i]				
Never	0.0% (0)	0.0% (0)	0.0% (0)	
1 time	38.9%(14)	29.6% (8)	66.7% (6)	
2-7 times	55.6%(20)	63.0%(17)	33.3% (3)	
8-14 times	5.6% (2)	7.4% (2)	0.0% (0)	
15+ times	0.0% (0)	0.0% (0)	0.0% (0)	0.161
Number of times used marijuana: Past 6 Months %(n)				
Never	35.3%(24)	18.4% (7)	56.7%(17)	
1 time	5.9% (4)	5.3% (2)	6.7% (2)	
2-7 times	30.9%(21)	44.7%(17)	13.3% (4)	
8-14 times	4.4% (3)	5.3% (2)	3.3% (1)	
15+ times	23.5%(16)	26.3%(10)	20.0% (6)	0.006
Number of days used marijuana: Past Month %(n)[j]				
Never	42.9%(24)	36.4%(12)	52.2%(12)	
1 day	10.7% (6)	6.1% (2)	17.4% (4)	
2-7 days	21.4%(12)	27.3% (9)	13.0% (3)	
8-14 days	12.5% (7)	15.2% (5)	8.7% (2)	
15+ days	12.5% (7)	15.2% (5)	8.7% (2)	0.350

[a] 2 values missing for Age at first drink: 2 boys, 0 girls

[b] 10 values missing for Age started drinking alcohol regularly: 6 boys, 4 girls

[c] 4 values missing for Age at first binge: 4 boys, 0 girls

[d] 8 values missing for Age of first marijuana use: 3 boys, 5 girls

[e] 1 value missing for Substances used during last binge & Number of days used alcohol, Past Month: 1 boy, 0 girls

[f] 2 values missing for Number of times intoxicated, Past 6 Months: 1 boy, 1 girl

[g] 18 values missing for Number of times engaged in binge drinking or drug use, Lifetime: 12 boys, 6 girls

[h] 19 values missing from Number of times engaged in binge drinking or drug use, Past Year: 13 boys, 6 girls

[I] 32 values missing from Number of times engaged in binge drinking or drug use, Past Month: 11 boys, 21 girls

[j] 12 values missing from Number of days used marijuana, Past Month: 5 boys, 7 girls

Table 4
Reasons for Engaging in Binge Substance Use

	Total	Boys	Girls	P-value
***N* = 65**				
Stress/lot on your mind	32.3%(21)	30.6%(11)	34.5%(10)	0.736
Intoxicated	23.3%(21)	33.3%(12)	31.0% (9)	0.844
Fight/argument with boy/girlfriend/spouse	18.5%(12)	19.4% (7)	17.2% (5)	0.820
Peer pressure/copying	18.5%(12)	11.1% (4)	27.6% (8)	0.114
No reason in particular	18.5%(12)	19.4% (7)	17.2% (5)	0.667
Can't remember anything about event	16.9%(11)	13.9% (5)	20.7% (6)	0.467
Family/home situation/problems	15.4%(10)	8.3% (3)	24.1% (7)	0.096
Trouble at school	13.8% (9)	8.3% (3)	20.7% (6)	0.278
Depression	13.8% (9)	13.9% (5)	13.8% (4)	1.000
Fight/argument with parent/relative	12.3% (8)	8.3% (3)	17.2% (5)	0.450
Other	7.7% (5)	11.1% (4)	3.4% (1)	0.370
Suicide/death of loved one/friend/relative	4.6% (3)	2.8% (1)	6.9% (2)	0.582
Trouble with the law	4.6% (3)	2.8% (1)	6.9% (2)	0.582
Divorce/separation	3.1% (2)	5.6% (2)	0.0% (0)	0.498
Fight/argument with someone not already listed	3.1% (2)	2.8% (1)	3.5% (1)	1.000
Loss of job	3.1% (2)	5.6% (2)	0.0% (0)	0.498
Prolonged illness of (yourself)	1.5% (1)	2.8% (1)	0.0% (0)	1.000
Idea for last binge drink/drug use came from: (N = 68)				
Friend	73.5%(50)	65.8%(25)	83.3%(25)	0.103
Acquaintance	29.4%(20)	26.3%(10)	33.3%(10)	0.528
Family	27.9%(19)	21.0% (8)	36.7%(11)	0.154
TV or Music	26.5%(18)	26.3%(10)	26.7% (8)	0.974
Internet	14.7%(10)	5.3% (2)	26.7% (8)	0.018
Other	13.2% (9)	13.2% (5)	13.3% (4)	1.000
Books/newspaper/article	4.4% (3)	2.6% (1)	6.7% (2)	0.579

DISCUSSION

This study represents one of the first examinations of substance use behaviors among AI adolescents who engaged in a recent binge drinking episode. Our indicated sample, which was uniquely identified through the community-based Celebrating Life Suicide Surveillance System and assessed by local, trusted Apache Research Assistants, appears representative of this at-risk population. Alcohol use was in line with other studies among AI youth (Friese et al., 2011), with 52.3% having used in the past month. However, this is higher than the 38.7% and 34.9% reported nationally among 9th-12th grade students across all races and ethnicities for the years 2011 and 2013 from the Youth Risk Behavior Surveys and Surveillance System (Kann et al., 2014). In addition to alcohol, marijuana was the other most frequently used drug of choice for this sample (88.2% reporting lifetime use), which is consistent with cross-site survey research of AI youth over the past decade (Beauvais, Jumper-Thurman, Helm, Plested, & Burnside, 2004; Miller et al., 2012; Stanley et al., 2014), but substantially higher than national rates among 9th-12th grade students across all races and ethnicities reported during similar time periods from the Youth Risk Behavior Surveys and Surveillance System (39.9-40.7%; Kann et al., 2014). Data support several important conclusions with meaningful implications that could be generalizable to other AI communities with similar risk profiles.

Despite the finding that both boys and girls start binging at similar ages (13.5 and 13.0, respectively), it appears boys are more severely affected. Boys engaged in more binging which is consistent with recent large scale survey data from AI adolescents in grades 8, 10, and 12 (Stanley et al., 2014). Boys also reported experiencing more severe episodes—a unique contribution of this data set. More specifically, boys reported that their binge drinking event was more lethal than what girls reported and that they were more likely to have been found passed out and received medical treatment. Demographic factors also revealed some potentially important factors deserving of future study. Participants commonly reported histories of household instability (i.e., living in more than one home in the past year). While, the nature of the relationship between household instability and substance misuse in American Indian youth populations remains unclear (Eitle, Johnson-Jennings, & Eitle, 2013; Lonczak, Fernandez, Austin, Marlatt, & Donovan, 2007, Heavyrunner-Rioux & Hollist, 2010), our previous work in girls has shown that the most salient risk factors for substance use were household instability, deviant peers, and poor family functioning (results unpublished).

Several striking findings speak specifically to a potential developmental trajectory of substance use and suicidal behavior among AI teens who engage in binge drinking, which the Apaches view as related forms of self-injury targeted through their innovative surveillance and prevention system (Barlow et al., 2012; Cwik et al., 2014; Mullany et al., 2009). The average starting age for trying alcohol and marijuana was 13.0; binge drinking and suicidal ideation (for a portion) was 14.0; suicide plan was 14.5 (for a portion); and drinking regularly, suicide attempt (for a portion) and non-suicidal self-injury (for a portion) was 15.0. These data show an overlap of binge drinking and the onset of suicidal thoughts, given that youth started binge drinking and having suicidal ideation around the same age. Moreover, in our indicated sample, almost half (47.1%) reported lifetime suicidal thoughts, which is much higher than reported in large-scale surveys of similar aged adolescents (Suicide Prevention Resource Center, 2013). Taken together, the data suggests a potentially heightened risk that binge drinking might convey to AI youth.

The current data parallels previous suicide prevention research with Apache youth, which shows that boys also engage in more serious self-injurious behavior, and they are much more likely to die from suicide and engage in substance use at the time of the act (Barlow et al., 2012; Mullany et al., 2009). In line with a prominent theory of suicide by Thomas Joiner, binge drinking may be functioning as a practice escape event (Joiner, 2005). Finally, Apache youth report similar reasons (e.g., conflict with family member or boy/girlfriend) for binge drinking and attempting suicide (Cwik et al., 2015), providing further support to the strong interrelationship between substance use and suicidal behavior, with the need for interventions that address both simultaneously. Programs that promote healthy relationships, as well as strengthen positive coping strategies such as communication, assertiveness, self-regulation, and conflict negotiation skills, could be useful in preventing both binge substance use and suicidal behaviors.

Data on age of first use from our sample indicates the importance of prevention before adolescence. Age of first drink and marijuana use was 13 years old, and youth reported first binge drinking episode about a year later (14 years old), consistent with other AI samples (Cheadle & Whitbeck, 2011; Walls et al., 2013) and earlier than the average for the U.S. population (SAMSHA, 2012). Thus, prevention must begin early (ages 10-12) and target both alcohol and marijuana use to delay initiation and foster trajectories away from more serious substance use patterns including binge drinking. Some participants reported very early starting ages. In previous work, earlier initiation of substance use among young expectant mothers was associated with high family conflict and low parental monitoring (Barlow et al., 2010). Key protective factors included ability to regulate emotions and having traditional AI values and practices. Therefore, very early prevention is indicated for local parenting programs. Additional studies by Apache-JHU research team have shown an early childhood home-visiting model effective in reducing adolescent mothers' substance use and reducing early childhood behavior risks that are predictive of childhood substance use risks (Barlow et al., 2015).

Study Strengths and Limitations

The study has several limitations. First, data is limited to self-report of substance use. Second, the sample size is modest, particularly when examining sex differences. Multiple pairwise comparisons increase the probability of a type I error. Third, the data is cross sectional; therefore, hypotheses regarding root causes of developmental trajectories are preliminary. Forth, the sample is not representative, making comparisons to the general population suggestive only. Outweighing these limitations, this study provides an important first step for deepening our understanding of potential differential trajectories of binge drinking and comorbid substance use and self-injurious behaviors among AI girls and boys with implications for future research. A major strength of this paper is its reliance on community-based surveillance data in one specific tribe, capturing a sample of youth who are not generally included in standard epidemiologic assessments and as such may more accurately reflect the characteristics and contexts of binge drinking youth in this community. Next steps include examining what puts youth who engage in binge drinking at risk and what protects youth who do not engage in this behavior. Continued research will be aimed at developing models to address potential root causes of binge substance use and shared risks between substance use and suicide, including the interpersonal component with methods such as social network analysis.

CONCLUSION

Binge alcohol use is a significant public health problem that affects adolescents of all ethnicities, their families, and communities. In-depth, community explorations of binge use behavior, such as this study, are needed to understand the context, motivations, and repercussions of this and other high risk behaviors to develop culturally meaningful prevention and intervention strategies.

REFERENCES

Barlow, A., Mullany, B., Neault, N., Goklish, N., Billy, T., Hastings, R., … Walkup, J. T. (2015). Paraprofessional-delivered home-visiting intervention for American Indian teen mothers and children: 3-year outcomes from a randomized controlled trial. *The American Journal of Psychiatry, 172*(2), 154-162. http://dx.doi.org/10.1176/appi.ajp.2014.14030332

Barlow, A., Tingey, L., Cwik, M., Goklish, N., Larzelere-Hinton, F., Lee, A., … Walkup, J. T. (2012). Understanding the relationship between substance use and self-injury in American Indian youth. *The American Journal of Drug and Alcohol Abuse, 38*(5), 403-408. http://dx.doi.org/10.3109/00952990.2012.696757

Barlow, A., Mullany, B. C., Neault, N., Davis, Y., Billy, T., Hastings, R., ... & Reid, R. (2010). Examining correlates of methamphetamine and other drug use in pregnant American Indian adolescents. *American Indian and Alaska Native Mental Health Research*, *17*(1), 1-24. http://dx.doi.org/10.5820/aian.1701.2010.1

Beauvais, F., Jumper-Thurman, P., Helm, H., Plested, B., & Burnside, M. (2004). Surveillance of drug use among American Indian adolescents: Patterns over 25 years. *Journal of Adolescent Health, 34*(6), 493-500. http://dx.doi.org/10.1016/j.jadohealth.2003.07.019

Cheadle, J. E., & Whitbeck, L. B. (2011). Alcohol use trajectories and problem drinking over the course of adolescence: A study of North American indigenous youth and their caretakers. *Journal of Health and Social Behavior*, *52*(2), 228-245. http://dx.doi.org/10.1177/0022146510393973

Chen, H. J., Balan, S., & Price, R. K. (2012). Association of contextual factors with drug use and binge drinking among white, Native American, and mixed-race adolescents in the general population. *Journal of Youth and Adolescence, 41*(11), 1426-1441. http://dx.doi.org/10.1007/s10964-012-9789-0

Cwik, M., Barlow, A., Tingey, L., Goklish, N., Larzelere-Hinton, F., Craig, M., & Walkup, J. (2015). Exploring risk and protective factors with a community sample of American Indian adolescents who attempted suicide. *Archives of Suicide Research, 19*(2), 172-189. http://dx.doi.org/10.1080/13811118.2015.1004472

Cwik, M. F., Barlow, A., Goklish, N., Larzelere-Hinton, F., Tingey, L., Craig, M., … Walkup, J. (2014). Community-based surveillance and case management for suicide prevention: An American Indian tribally initiated system. *American Journal of Public Health, 104*(Suppl 3), e18-23. http://dx.doi.org/10.2105/AJPH.2014.301872

Eitle, T. M., Johnson-Jennings, M., & Eitle, D. J. (2013). Family structure and adolescent alcohol use problems: Extending popular explanations to American Indians. *Social Science Research, 42*(6), 1467-1479. http://dx.doi.org/10.1016/j.ssresearch.2013.06.007

Friese, B., Grube, J. W., Seninger, S., Paschall, M. J., & Moore, R. S. (2011). Drinking behavior and sources of alcohol: Differences between Native American and white youths. *Journal of Studies on Alcohol and Drugs, 72*(1), 53-60. http://dx.doi.org/10.15288/jsad.2011.72.53

Heavyrunner-Rioux, A. R., & Hollist, D. R. (2010). Community, family, and peer influences on alcohol, marijuana, and illicit drug use among a sample of Native American youth: An analysis of predictive factors. *Journal of Ethnicity in Substance Abuse, 9*(4), 260-283. http://dx.doi.org/10.1080/15332640.2010.522893

Joiner, T. E. (2005). *Why people die by suicide*. Cambridge, MA: Harvard University Press.

Kann, L., Kinchen, S., Shanklin, S. L., Flint, K. H., Hawkins, J., Harris, W. A., ... & Whittle, L. (2014). Youth risk behavior surveillance—United States, 2013. *Morbidity and Mortality Weekly Report*, *63*(SS04), 1-168. Retrieved from https://www.cdc.gov/mmwr/preview/mmwrhtml/ss6304a1.htm

Lonczak, H. S., Fernandez, A., Austin, L., Marlatt, G. A., & Donovan, D. M. (2007). Family structure and substance use among American Indian youth: A preliminary study. *Families, Systems, & Health*, *25*(1), 10-22. http://dx.doi.org/10.1037/1091-7527.25.1.10

Miller, J. W., Naimi, T. S., Brewer, R. D., & Jones, S. E. (2007). Binge drinking and associated health risk behaviors among high school students. *Pediatrics*, *119*(1), 76-85. http://dx.doi.org/10.1542/peds.2006-1517

Miller, K. A., Stanley, L. R., & Beauvais, F. (2012). Regional differences in drug use rates among American Indian youth. *Drug and Alcohol Dependence*, *126*(1-2), 35-41. http://dx.doi.org/10.1016/j.drugalcdep.2012.04.010

Mullany, B., Barlow, A., Goklish, N., Larzelere-Hinton, F., Cwik, M., Craig, M., & Walkup, J. T. (2009). Toward understanding suicide among youths: Results from the White Mountain Apache tribally mandated suicide surveillance system, 2001-2006. *American Journal of Public Health*, *99*(10), 1840-1848. http://dx.doi.org/10.2105/AJPH.2008.154880

Mullany, B., Barlow, A., Neault, N., Billy, T., Hastings, R., Coho-Mescal, V., … Walkup, J. T. (2013). Consistency in the reporting of sensitive behaviors by adolescent American Indian women: A comparison of interviewing methods. *American Indian and Alaska Native Mental Health Research*, *20*(2), 42-51. http://dx.doi.org/10.5820/aian.2002.2013.42

Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-injurious thoughts and behaviors interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment*, *19*(3), 309-317. http://dx.doi.org/10.1037/1040-3590.19.3.309

Pemberton, M. R., Colliver, J. D., Robbins, T. M., & Gfroerer, J. C. (2008). *Underage alcohol use: Findings from the 2002-2006 National Surveys on Drug Use and Health.* (DHHS Publication No. SMA 08-4333, Analytic Series A-30). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies.

Posner, K., Oquendo, M. A., Gould, M., Stanley, B., & Davies, M. (2007). Columbia Classification Algorithm of Suicide Assessment (C-CASA): Classification of suicidal events in the FDA's pediatric suicidal risk analysis of antidepressants. *American Journal of Psychiatry*, *164*(7), 1035-1043. http://dx.doi.org/10.1176/appi.ajp.164.7.1035

Substance Abuse and Mental Health Services Administration. (2012). *Report to Congress on the Prevention and Reduction of Underage Drinking.* Washington DC: U.S. Department of Health and Human Services. Retrieved from http://store.samhsa.gov/product/PEP12-RTCUAD

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience and Biobehavioral Reviews, 24*(4), 417-463. http://dx.doi.org/10.1016/S0149-7634(00)00014-2

Stanley, L. R., Harness, S. D., Swaim, R. C., & Beauvais, F. (2014). Rates of substance use of American Indian students in 8th, 10th, and 12th grades living on or near reservations: Update, 2009-2012. *Public Health Reports (Washington, D.C.: 1974), 129*(2), 156-163.

Suicide Prevention Resource Center. (2013). *Suicide among racial/ethnic populations in the U.S.: American Indians/Alaska Natives.* Waltham, MA: Education Development Center, Inc.

Vereecken, C. A., & Maes, L. (2006). Comparison of a computer-administered and paper-and-pencil-administered questionnaire on health and lifestyle behaviors. *Journal of Adolescent Health, 38*(4), 426-432. http://dx.doi.org/10.1016/j.jadohealth.2004.10.010

Walls, M., Sittner Hartshorn, K. J., & Whitbeck, L. B. (2013). North American indigenous adolescent substance use. *Addictive Behaviors, 38*(5), 2103-2109. http://dx.doi.org/10.1016/j.addbeh.2013.01.004

Whitbeck, L. B., & Armenta, B. E. (2015). Patterns of substance use initiation among indigenous adolescents. *Addictive Behaviors, 45*, 172-179. http://dx.doi.org/10.1016/j.addbeh.2015.01.006

Whitbeck, L. B., Sittner Hartshorn, K. J., Crawford, D. M., Walls, M. L., Gentzler, K. C., & Hoyt, D. R. (2014). Mental and substance use disorders from early adolescence to young adulthood among indigenous young people: Final diagnostic results from an 8-year panel study. *Social Psychiatry and Psychiatric Epidemiology, 49*(6), 961-973. http://dx.doi.org/10.1007/s00127-014-0825-0

Whitesell, N. R., Asdigian, N. L., Kaufman, C. E., Big Crow, C., Shangreau, C., Keane, E. M., … Mitchell, C. M. (2014). Trajectories of substance use among young American Indian adolescents: Patterns and predictors. *Journal of Youth and Adolescence, 43*(3), 437-453. http://dx.doi.org/10.1007/s10964-013-0026-2

Whitesell, N. R., Beals, J., Mitchell, C. M., Spicer, P., Novins, D. K., Manson, S. M., & AI-SUPERPFP Team. (2007). Disparities in drug use and disorder: Comparison of two American Indian reservation communities and a national sample. *The American Journal of Orthopsychiatry, 77*(1), 131-141. http://dx.doi.org/10.1037/0002-9432.77.1.131

FUNDING INFORMATION AND ACKNOWLEDGEMENTS

The authors report no conflicts of interest. We respectfully acknowledge the White Mountain Apache youths, families, community members, and tribal leaders for their innovation and leadership in pioneering research strategies. We are grateful to the national Native American

Research Centers in Health initiative, through which grant support was received for this project from the National Institute of General Medical Science and Indian Health Service (grant U26IHS300414; Principal Investigator, Mary F. Cwik, PhD).

AUTHOR INFORMATION

Drs. Cwik, Tingey, and Barlow are associate scientists at the Center for American Indian Health at John Hopkins University Bloomberg School of Public Health. Drs. Rosenstock and Haroz are assistant scientists at the Center for American Indian Health; Dr. Haroz's primary appointment is in the Department of Mental Health. Ms. Goklish and Ms. Larzelere are research associates and Ms. Suttle a Research Program Assistant at the Center for American Indian Health, as well as members of the White Mountain Apache Tribe. Dr. Hill is an associate faculty member at the Center for American Indian Health. Ms. Craig is the Principal Investigator for the White Mountain Apache Native American Research Centers in Health initiative and a tribal member.

DEMOGRAPHIC, SOCIAL, AND MENTAL HEALTH ASPECTS OF AMERICAN INDIAN AND ALASKA NATIVE ADOLESCENTS IN HAWAI‘I

Sean M. Munnelly, MD, Earl S. Hishinuma, PhD, Mark Lee, BS, BA,
Myra D. Smith, MPH, and Kayne McCarthy, MPH

Abstract: American Indians and Alaska Natives (AI/ANs) constitute 2.2% of Hawai‘i’s population. Unfortunately, very little is known about the mental health of AI/AN youth in Hawai‘i. The purpose of this study (N = 7,214; 1992-1996) was to describe AI/AN adolescents versus non-AI/AN youth regarding demographic, social, and mental health variables. The results suggested that AI/AN adolescents were more open to different types of social-emotional supports, had relatively more non-traditional families with a smaller social network, and may be more vulnerable to academic and health difficulties, with particular risk for mental health issues for mixed AI/AN-Native Hawaiians. Implications are discussed, including intervention, socio-political issues, and future research.

INTRODUCTION

Nationally

American Indian and Alaska Native (AI/AN) adolescents in the U.S. represent one of the fastest-growing and diverse groups of youth (Center for Native American Youth, 2016). There are 562 federally recognized tribes (Indian Nations) in the U.S. (National Congress of American Indians, n.d.). Approximately 229 of these are located in Alaska. The remainder of the tribes is located in 33 other states. Knowing the demographic, social, and behavioral health aspects of a particular group of AI/AN adolescents is important because this information may help to identify critical epidemiologic outcomes, such as prevalence and risk-protective factors. This knowledge, in turn, may suggest prevention and intervention strategies that may help increase protective factors, decrease risk factors, and ultimately improve the mental health of AI/AN youth. This collective knowledge will also help to advance our scientific field in discerning similarities and differences across different groups of AI/AN adolescents.

There have been several seminal reviews on the mental and behavioral health of AI/AN adolescents (Gone & Trimble, 2012; Goodkind et al., 2010; Sarche, Spicer, Farrell, & Fitzgerald, 2011; Whitbeck, Walls, & Hartshorn, 2014). These resources have set the foundation for intervention and future research and have shown that AI/AN adolescents are at increased risk for socioeconomic, demographic, social-behavioral health, and physical health disparities (e.g., poverty, unemployment, low educational attainment, infant mortality, violence, substance use, mood and anxiety disorders, and suicide; American Indian and Alaska Native Mental Health Research, 1994; Center for Native American Youth, 2016; Gone & Trimble, 2012; Goodkind et al., 2010; Sarche et al., 2011).

However, it is important to note that there are also clear protective and resiliency factors. Whitbeck et al. (2014) found that one crucial aspect of resiliency was creating and maintaining pro-social networks as adolescents mature and develop. In addition, positive life events outweigh stressful events in influencing self-esteem. The important and supportive role that culture plays has been reinforced in other reviews (e.g., Center for Native American Youth, 2016).

Goodkind et al. (2010) highlighted seven focal causes of behavioral health disparities and focused on delivering culturally relevant services. One fundamental challenge to improving behavioral health care for AI/AN youth is the “divergence of Western and traditional indigenous approaches to mental health care and healing, and the disregard for effective indigenous practices in service provision, policy, and funding” (Goodkind et al., 2010, p. 387). This article also provided important policy recommendations. In essence, these recommendations acknowledged that due to “the process of colonization that occurred, the solution cannot be conceived of as the integration of two equal systems of care. Instead, it must involve primacy being given to traditional teachings and practices and an overall emphasis on the restoration of harmony” (p. 391).

These issues of cultural appropriateness in providing supports are also related to the ancestry and cultural identification of AI/AN youth. For example, when an AI/AN adolescent is of part or full AI/AN ancestry, then their cultural identification may need to be taken into account when addressing behavioral health disparities (e.g., Markstrom, Whitesell, & Galliher, 2011; Snipp & Saraff, 2011).

Hawaiʻi

There are important reasons to study AI/ANs in Hawaiʻi. First, very little is known about indigenous AI/AN adolescents who reside in Hawaiʻi. Based on a literature review, there were no studies that primarily focused on AI/ANs in Hawai‘i and their behavioral health, despite there being a growing concern for and scientific literature on the disparities experienced by the indigenous adolescents of the Hawaiian Islands—that is, Native Hawaiians (*kanaka maoli*). Although they reside in their homeland, Native Hawaiian adolescents tend to have lower socioeconomic status (Kamehameha Schools, 2014; Office of Hawaiian Affairs, 2015) and poorer mental health (e.g., Andrade et al., 2006; Choi-Misailidis & Kaulukukui, 2004).

Second, while different AI/AN tribes have many commonalities, there are also many intragroup differences within AI/ANs (e.g., geography). Being geographically distant from the continental U.S. and in the middle of the Pacific Ocean, Hawai‘i may further remove AI/ANs from tribal attachments and present additional stressors to AI/ANs. This difference may be especially important because of the protective nature of culture against behavioral health disparities.

Third, Hawai‘i has unique demographics as compared to the continental U.S., including having Native Hawaiians as the indigenous culture. Understanding the similarities and differences between these two indigenous cultures (e.g., Native Hawaiians and AI/ANs) will be valuable for both applied and scientific reasons (e.g., identifying overlapping risk and protective factors between the two cultures). In addition, Hawai‘i is unique in that it has one of the highest proportions of residents who are of mixed ancestry in the U.S.

Lastly, the more that is learned about AI/ANs in Hawai‘i, the more capable practitioners and researchers will become in promoting AI/ANs’ well-being through prevention, intervention, and further research. In addition, knowledge gained about AI/ANs in Hawai‘i may provide insights into AI/ANs residing in other remote locations on the continental U.S. (e.g., indigenous healing, bi- and multi-culturalism, access to and utilization of care).

Census

Based on the 2010 U.S. Census, Hawai‘i consists of: 38.6% Asian Americans, 24.7% European Americans, 23.6% two or more races, 10.0% Native Hawaiians and/or Pacific Islanders, 1.6% African Americans, 0.3% (full) American Indians/Alaska Natives, and 1.2% “some other race” (U.S. Census Bureau, 2015). When examining all full- and part-Native Hawaiians (typically referred to as being ‘‘Native Hawaiian’’ or ‘‘Hawaiian’’), the population of Hawai‘i consists of 19.8% Native Hawaiians (U.S. Census Bureau, 2000).

Our knowledge of AI/ANs in Hawai‘i is mainly derived from national surveys, such as the U.S. Census (i.e., see Table 1; U.S. Census Bureau, 2011-2013). For example, of the total

Hawaiʻi population of AI/ANs (1,390,3480), 2.2% (31,052) are of one or more ancestries. Moreover, a much higher proportion of AI/ANs is of mixed ancestry (90.5%) compared to the mixed ethnicity percent of the entire Hawaiʻi population (23.6%). This difference is also true for the U.S. as a whole, where 51.1% of AI/ANs are of mixed ancestry compared to only 2.8% of the entire U.S. population. In addition, AI/ANs (mixed or full) in Hawaiʻi and the U.S. are comprised of a larger proportion of children and adolescents compared to the general population (e.g., higher proportion of individuals under the age of 18 and higher proportion of individuals enrolled in high school). Further, the general trend for AI/ANs of one or more ancestries for both Hawaiʻi and the U.S. as compared to their respective populations is lower socioeconomic status, including 1) higher percentage of grandparents responsible for grandchildren; 2) higher proportion of families with children in poverty; 3) higher rate of individuals 16 years of age or over who are unemployed; 4) lower household median income; 5) lower percent with health insurance; and 6) lower proportion completing a college or professional degree. Lastly, AI/ANs in both the U.S. and in Hawaiʻi had a slightly higher rate of being civilian veterans as compared to their respective populations. The only inconsistent result was AI/ANs of one or more ancestries in Hawaiʻi had a smaller average family size than Hawaiʻi's population, but the converse was true for the U.S. population.

Table 1
U.S. Census Data, American Community Survey, 2011-2013

		United States[a]		**Hawai'i**[b]	
Demographic	**Description**	**Total**	**AI/ANs**	**Total**	**AI/ANs**
Race	One race	97.1%	48.9%	76.4%	9.5%
	More than one race	2.8%	51.1%	23.6%	90.5%
Age	< 18 years of age	23.5%	30.0%	22.0%	32.1%
	≥ 18 years of age	76.5%	70.0%	77.9%	67.8%
High School	Enrollment	20.6%	22.4%	19.9%	22.4%
Family	Average size	3.25	3.56	3.59	3.35
Grandparents	30 years or over responsible for grandchildren	38.2%	51.0%	24.0%	33.4%
Poverty	All families with children under 18 years of age	18.6%	29.6%	12.3%	18.2%
Employment	16 years and over unemployed	5.9%	9.3%	4.3%	7.7%
Income	Household median income	$52,176	$38,367	$66,308	$54,146
Health Coverage	No health insurance	14.8%	22.4%	6.9%	8.3%
Educational Achievement	Bachelor's degree or graduate/ professional degree	29.1%	17.6%	30.3%	22.9%
Veterans	Civilian veterans	8.7%	9.4%	10.7%	13.2%

[a] United States total population = 313,861,723; American Indians/Alaska Natives = 5,208,962
[b] Hawai'i total population = 1,390,348; American Indians/Alaska Natives = 31,052

Other Studies

Unfortunately, the U.S. Census does not collect data on many other important domains, such as academic, social, physical and mental health, and cultural identification factors. In addition, other national and statewide surveys regarding Hawai‘i youth typically do not have sufficient numbers of AI/AN adolescents in their databases such that only cautious statements can be made about AI/AN adolescents in Hawai‘i. What little we know has come from one study conducted by the National Center on Indigenous Hawaiian Behavioral Health (formerly, Native Hawaiian Mental Health Research Development Program). Hishinuma et al. (2005) examined violence victimization (defined as an individual who “was a victim of violence [was physically harmed by someone]”) for adolescents, their family members, and their close friends within the past six months (Major Life Events Scale; Andrews, Lewinsohn, Hops, & Roberts, 1993). There was no statistically significant difference ($p > .05$) in proportion of adolescents who self-reported being a victim of violence between part-full AI/AN (4.4%) and all other youth (3.2%), although part-full AI/AN females (5.0%) tended to self-report at a higher rate than part-full AI/AN males (3.7%). However, part-full AI/AN adolescents reported significantly more family members (9.7%, $p < .01$) and close friends (15.8%, $p < .01$) being victims of violence than non-AI/AN youth (6.6%, 10.1%, respectively). In addition, part-full AI/AN females tended to self-report at a higher rate than AI/AN males for family members (females = 11.0%, males = 8.2%) and close friends (females = 20.1%, males = 10.8%) being victims of violence. Therefore, the results suggested that female part-full AI/AN adolescents were at greater risk of being victims of violence compared to their male counterparts, and part-full AI/AN family members and close friends were at greater risk of being victims of violence than non-AI/AN family members and close friends.

Purpose

The U.S. Census data and the one study cited above suggested that AI/AN adolescents may be at greater risk than non-AI/AN youth in Hawai‘i for socio-economic, health, and behavioral disparities. The purpose of the present study is to describe the similarities and differences between AI/AN adolescents and non-AI/AN youth who reside in Hawai‘i based on demographic, social, academic, physical health, mental health, and cultural measures.

METHODS

Sample Description

Data were from a five-year longitudinal cohort study conducted by the National Center on Indigenous Hawaiian Behavioral Health (NCIHBH; formerly the Native Hawaiian Mental Health Research Development Program) using the Hawaiian High Schools Health Survey (HHSHS; see Andrade et al., 2006). The HHSHS was based on the Sequoia High School Health Survey (Ackerson, Wiegman-Dick, Manson, & Baron, 1990). The HHSHS questionnaire was administered to adolescents in Grades 9 through 12 from five participating schools on three Hawaiian Islands between the school years 1991-1992 and 1995-1996. A total of 12,284 surveys were completed by 7,317 participants.

For participants who completed more than one survey across the study period, the data from the first survey they completed were utilized. Of the 7,317 students who participated, only 103 (1.4%) did not complete the ethnicity question (see Measures section). Given the purpose of comparing across ethnic groups, data from these 103 students were not included in the analyses. Table 2 presents the sample description (*N* = 7,214).

For the purposes of the present study, four mutually exclusive ethnic groups were used:

1) 287 of AI/AN ancestry (A; full or part, but no Native Hawaiian ancestry)
2) 614 of AI/AN and Native Hawaiian ancestries (AH; which could include other ancestries)
3) 4,219 of Native Hawaiian ancestry (H; full or part, but no AI/AN ancestry)
4) 2,094 of Other ancestry (O; with no AI/AN and/or Native Hawaiian ancestry), including Chinese (0.9%), Japanese (22.0%), European American (9.9%), Filipino (16.3%), Portuguese (0.8%), Korean (1.0%), Hispanic (0.4%), Samoan (1.3%), Tongan (0.3%), African American (0.2%), Puerto Rican (0.1%), or Mixed or other but no Native Hawaiian or AI/AN (46.6%)

Native Hawaiian youth were over-represented because the original purpose of the larger study was to investigate the mental health of Native Hawaiians. More females than males completed surveys, with this difference greater for AI/AN-Hawaiians as compared to Native Hawaiians and Others. There were more ninth graders primarily because we examined the first survey taken for each student. The three indigenous groups had significantly more ninth graders than the Other group, and the Other group had significantly more eleventh graders than AI/AN-Hawaiians and Native Hawaiians. Despite these grade-level differences, there were no overall age differences ($p > .05$) among the four groups: AI/AN ($M = 15.5$, $SD = 1.3$, $n = 287$); AI/AN-Hawaiian ($M = 15.4$, $SD = 1.2$, $n = 613$); Native Hawaiian ($M = 15.5$, $SD = 1.3$, $n = 4{,}216$); and Other ($M = 15.5$, $SD = 1.2$, $n = 2{,}090$).

Table 2
Sample Description ($N = 7{,}214$)

		Total		One-Way χ^2	Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way X^2		
		N	%^{a}	MC (Pair-wise)^b	n	%^{a}	n	%^{a}	n	%^{a}	n	%^{a}	Overall R^{2c}	MC (2x4 Cross-tabs) p^d	MC (2x2 Cross-tabs)^e
Total (row percents)		7,214	100.0	H > O > AH > A	287	4.0	614	8.5	4,219	58.5	2,094	29.0			
What is your sex?	Female	3,725	51.7	Females > Males	154	53.7	348	56.7	2,184	51.8	1,039	49.6	.001	*	AH > H & O
	Male	3,484	48.3		133	46.3	266	43.3	2,031	48.2	1,054	50.4			
What is your grade in school right now?	9th	2,925	40.6	9th > 10th & 11th > 12th	125	43.9	282	46.0	1,780	42.3	738	35.3	.006	****	A, AH, & H > O
	10th	1,549	21.5		58	20.4	124	20.2	896	21.3	471	22.6			
	11th	1,445	20.1		57	20.0	106	17.3	787	18.7	495	23.7		****	O > AH & H
	12th	1,278	17.8		45	15.8	101	16.5	747	17.7	385	18.4			

Note: AI/AN = American Indian or Alaska Native. MC = Multiple Comparisons.
*$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$
[a] Column percents
[b] One-way multiple comparisons were performed only if the overall one-way chi-square test was statistically significant; all overall one-way chi-square tests were statistically significant ($p < .05$)
[c] Square of the phi coefficient for interaction
[d] Two-way multiple comparisons (2x4) were performed only if the overall two-way chi-square test was statistically significant; all overall two-way chi-square tests were statistically significant ($p < .05$)
[e] Two-way multiple comparisons (2x2) were performed only if the two-way multiple comparisons (2x4) were statistically significant ($p < .05$)

Measures

Tables 2, A1, and A2 provide the exact wording for the questions and possible responses on the HHSHS questionnaire (see table footnotes as well). The questions fall into six categories: demographics, social, academic achievement, physical health, mental health, and culture.

Participants self-reported their demographic information, such as their sex, grade level, age, and length of time on island. Social questions asked the participants to identify their key family members and discuss those members’ educational attainment, occupation status, and veteran status. In addition, participants were asked about the number of people in their household and the magnitude of their parents’ expectation for their success. Further, participants were asked to complete six items for both the Perceived Social Support from Family Scale and the Perceived Social Support from Friends Scale (Procidano & Heller, 1983). These six items have been shown to be reliable and valid with the same sample (e.g., Nahulu et al., 1996). Participants’ academic achievement was measured by their education goals, academic achievement relative to the achievement of their classmates, grades, satisfaction with school, perceived likelihood that the participant will complete the current school year, and perceived likelihood that the participant will complete high school. The physical health questions asked participants to report their level of concern with their physical health, their quality of physical health relative to their peers, frequency of physician and nurse visits, and number of sick days. Participants reported if they had a mental health condition, their level of concern of the mental health condition, their care-seeking preferences, and the amount of time since they had counseling. Finally, the culture section measured participants affiliation with Native Hawaiian cultural traditions through questions such as frequency of utilization of a Native Hawaiian healer; perceived importance of maintaining the Native Hawaiian culture; and value of Native Hawaiian beliefs, behaviors, and attitudes.

Procedures

Prior to the administration of the HHSHS questionnaire, parents and students were provided written materials describing the nature and purpose of the study. Parents were asked to return a postcard if they did not want their child to participate in the study. Students who had their parents’ permission to participate had the option of providing their formal agreement or not providing their formal agreement on the day of the HHSHS questionnaire administration. Students who provided their written agreement completed the survey in their homerooms while supervised by their teachers. At the time this study was implemented (in 1992), this type of “passive consent” was considered appropriate and was approved by the University of Hawaiʻi at Mānoa’s Committee on Human Studies (i.e., Institutional Review Board). The survey generally took 30 to 45 minutes to complete. Approximately 60% of the student body was surveyed. A previous analysis showed that there was a higher proportion of females who were surveyed. Individuals who were surveyed were more likely to have fewer absences, suspensions, and conduct infractions, and higher grade-point averages (Andrade et al., 2006).

Data Analyses

The analyses were conducted using SAS 9.2. Chi-square tests were used to assess differences for demographic, social, and mental health categorical variables. First, an overall one-way chi-square test was used to determine if there was an unequal distribution among all categories of the variable in question. If the overall one-way chi-square test was statistically significant ($p < .05$), the overall one-way chi-square test was partitioned into 2-by-1 crosstabs to perform pairwise multiple comparisons between categories of a variable. A category with a significantly lower proportion than another category was notated with a less-than sign. To assess the interaction between ethnicity and the variable in question, an overall two-way chi-square test was conducted. If the overall two-way chi-square test was statistically significant, then multiple comparisons (2-by-4 crosstabs) were used to assess the differences in proportion of a single category of a variable by the four ethnic groups. If a given 2-by-4 comparison was statistically significant, then multiple comparisons (2-by-2 crosstabs) were used to compare the proportion of a category of a variable for two ethnic groups at a time.

Differences among ethnic groups for demographic, academic, social, physical health, mental health, and cultural continuous variables were assessed using analysis of variance (ANOVA). First, an overall one-way ANOVA was used to determine if there were differences among the four ethnic groups for the variable in question. If the overall one-way ANOVA was statistically significant, pairwise multiple comparisons were used to identify differences between two ethnic groups at a time.

RESULTS

Table A1 presents the results for tests with categorical response variables. Table A2 presents the results of tests with continuous response variables.

Demographic

Main Wage Earner (Table A1). In general, AI/ANs had a higher proportion of the main wage earner being the biological mother, stepfather, and/or foster parents, and a lower proportion being the biological father, as compared to the other ethnic groups. The two ethnic group categories that included Native Hawaiians had higher proportions of the main wage earner being the grandparents, as compared to the Other ethnic group. Mixed results were noted for the highest educational level of the main wage earners. The Other ethnic group's most-frequent educational level for main wage earners was college graduate, whereas for the other three ethnic groups, the most-frequent educational level for main wage earners was high school graduate or GED (general educational development). Regarding the source of income, AI/ANs had the lowest proportion of main wage earners employed full-time, while non-AI/AN Native Hawaiians had the highest proportion. AI/ANs had a higher proportion of main wage earners being on welfare (as compared to non-AI/AN Native Hawaiians & Others) and had a higher proportion of main wage earners being self-employed/own business or farm (compared to the two Native Hawaiian groups). Both Native Hawaiian groups had a higher proportion of main wage earners being a military veteran compared to the Other ethnic group.

Duration of Time Lived on Oʻahu (Table A2). Oʻahu is the most-populated island of Hawaiʻi. As would be expected, Native Hawaiians had the greatest average number of years having lived on "this island" (i.e., Oʻahu), followed by AI/AN-Native Hawaiians, the Other ethnic group, and then AI/ANs.

Social

Most Important Persons Who Brought Up Adolescent (Table A1). Regarding the most important persons who brought up the adolescents, AI/ANs had higher proportions of stepfathers and foster parents; the Other ethnic group had higher proportions of traditional biological mothers and biological fathers; and Native Hawaiian ethnic groups had higher proportions of aunts, grandmothers, and grandfathers. In general, of these most-important persons, the ones with the highest educational achievement relative to the other ethnic groups for AI/ANs were stepfathers and foster parents, for Native Hawaiians were biological mothers and biological fathers, and for AI/AN-Native Hawaiians were grandmothers, grandfathers, foster parents, and *hānai* (adopted) parents. The results regarding the educational levels achieved by the most important persons were mixed. Overall, the Other ethnic group attained higher education levels and the Other ethnic group's most-frequent educational level was college graduate, whereas for the other three ethnic groups, the most-frequent educational level was some college.

Relatives Frequently Seen (Table A1). For the relatives frequently seen besides the adolescents' parents, AI/ANs tended to have lower proportions seeing their grandmothers and their maternal grandfather as compared to non-AI/AN Native Hawaiians. The two ethnic groups that included Native Hawaiians had higher proportions than the Other ethnic group seeing their uncles, aunts, and cousins.

Number of People in Home (Table A2). The two Native Hawaiian ethnic groups had a higher average number of people who lived in their homes as compared to the remaining non-Native Hawaiian groups (i.e., AI/AN, Other).

Parent Expectations (Table A2). There were no statistically significant differences among the four ethnic groups.

Perceived Family Support (Table A2). Native Hawaiians indicated higher levels of family support compared to the AI/AN and the Other ethnic groups, and mixed AI/AN-Native Hawaiians self-reported higher levels of family support than the Other ethnic group.

Perceived Friend Support (Table A2). Native Hawaiians indicated higher levels of friend support than the other three ethnic groups.

Academics

Educational Goals (Table A1). Although the large majority of students across all ethnic groups did not plan to drop out of high school, the two ethnic groups with AI/ANs (i.e., AI/ANs, AI/AN-Native Hawaiians) were more likely to self-report that their educational goal was to drop out of school as compared to the two remaining ethnic groups. AI/ANs were also more likely to report that their educational goal was to graduate from a technical school or two-year college as compared to the two Native Hawaiian ethnic groups.

Doing Well in School Compared to Classmates (Table A2). The Other ethnic group was more likely to rate themselves as doing better than their classmates compared to the three other ethnic groups.

Grades in Last Report Card (Table A2). The Other ethnic group self-reported higher academic grades for the last report card, followed by non-AI/AN Native Hawaiians, with the two AI/AN groups reporting the lowest grades.

Feelings About Going to School (Table A2). The non-AI/AN Native Hawaiians and Other ethnic group liked school more than the two AI/AN groups.

Chances of Completing School Year (Table A2). The Other ethnic group rated their likelihood of completing the school year higher than the other three ethnic groups.

Chances of Getting a High School Diploma (Table A2). There were no statistically significant differences among the four ethnic groups for self-rating of likelihood to complete high school.

Physical Health

Physical Health Worried or Concerned Adolescent in Past Month (Table A2). The two Native Hawaiian (i.e., Native Hawaiian, mixed AI/AN-Native Hawaiian) groups self-reported higher levels of being worried or concerned about their physical health in the past month, as compared to the other two ethnic groups.

Health Compared to Other Adolescents Their Age (Table A2). There were no statistically significant results among the four ethnic groups.

Number of Times Seen a Nurse or Doctor in the Past Six Months (Table A2). The Other ethnic group had a significantly lower average number of times seeing a nurse or doctor in the past six months compared to the remaining three ethnic groups.

Number of School Days Absent Because Sick in Past Month (Table A2). The Other ethnic group had a lower average number of absences due to sickness in the past six months compared to the remaining three ethnic groups. In addition, AI/ANs had a higher number of absences than the Native Hawaiians.

Mental Health

Preferred Person to See for Help (Table A1). AI/ANs were more likely to prefer seeing a church minister or priest when they had mental or emotional problems compared to the remaining three ethnic groups. In contrast, the two Native Hawaiian groups preferred seeing nurses and Native Hawaiian healers more than AI/ANs and the Other ethnic group, and the Other ethnic group preferred seeing teachers or school counselors more than the remaining three ethnic groups.

Had Any Serious Personal, Emotional, Behavioral, or Mental Health Problems in Past Six Months (Table A1). In general, the mixed AI/AN-Native Hawaiian group had a higher proportion of adolescents who self-reported having had a serious personal, emotional, behavioral, or mental health problem that they felt needed special help or counseling during the past six months. Of these 151 mixed AI/AN-Native Hawaiians, 63 (42%) sought help and 88 (58%) did not seek help. The Other ethnic group had a higher proportion of adolescents who indicated that they had not been bothered by personal problems in the past six months.

Discussed Problems with Family or Friends (Table A1). AI/ANs had a higher proportion of adolescents who discussed problems with family or friends, but self-reported that this action did not help at all, as compared to the Native Hawaiians and Other ethnic group.

Mental Health Worried or Concerned Adolescent in Past Month (Table A2). The two Native Hawaiian (i.e., Native Hawaiian, mixed AI/AN-Native Hawaiian) groups self-reported higher levels of being worried or concerned about their mental health in the past month, as compared to the other two ethnic groups.

Last Time Received Counseling or Any Other Mental Health Service (Table A2). Mixed AI/AN-Native Hawaiians had more recent counseling or any other mental health service, followed by AI/ANs and Native Hawaiians, and then the Other ethnic group.

Native Hawaiian Culture

Number of Times Gone to See Native Hawaiian Healer in Past Six Months (Table A2). The two Native Hawaiian (i.e., Native Hawaiian, mixed AI/AN-Native Hawaiian) groups had significantly more visits to a Native Hawaiian healer in the past six months compared to the remaining two ethnic groups.

Importance in Maintaining Hawaiian Cultural Traditions (Table A2). Same as above.

Value of Hawaiian Beliefs, Behaviors, and Attitudes (Table A2). Same as above.

DISCUSSION

The purpose of the present study was to describe the similarities and differences between AI/AN adolescents and non-AI/AN youth who reside in Hawaiʻi on demographic, social, academic, physical health, mental health, and cultural measures.

The overall results suggested that AI/AN adolescents, as compared to the other three ethnic groups, had *relatively* more non-traditional families with a smaller social network and may be more vulnerable to academic failure and health issues, with particular risk for mental health problems for those of mixed AI/AN-Native Hawaiian ancestry. For example, relative to the other groups, AI/ANs reported: (1) a larger proportion with stepfathers and foster parents as the most important persons who brought them up; (2) a larger proportion with stepfathers, foster parents, and biological mothers as the main wage earners who were comparatively less likely to be employed full-time and more likely to be on welfare or self-employed/own business or farm; (3) a smaller number of people who they lived with; (4) less contact with grandparents; (5) lower levels of perceived social (family, friend) support when compared to Native Hawaiians; and (6) having lived on the island of Oʻahu for the shortest time. Academically, especially in comparison to the Other ethnic group, AI/ANs self-reported lower educational goals, not doing as well in school, poorer last-report-card grades, liking school less, and lower chances of completing the school year. Although AI/ANs worried less about their physical health in the past month (compared to Native Hawaiians and mixed AI/AN-Native Hawaiians), AI/ANs saw a nurse or doctor more often in the past six months than the Other ethnic group and had more school absences due to being sick in the past month than the Other ethnic group and Native Hawaiians. Mixed AI/AN-Native Hawaiians (1) worried more about their mental health in the past month (compared to AI/ANs and the Other ethnic group); (2) had more serious mental health problems in the past six months, with approximately 3 in every 5 of them not seeking help; and (3) had more recent counseling or any other mental health service. AI/ANs had a higher percent who discussed problems with family members or friends relative to the other ethnic groups, although AI/ANs also had a higher proportion who self-reported that this did not help at all (as compared to Native Hawaiians and the Other ethnic group). Compared to the other three ethnic groups, AI/ANs had a greater preference seeing a church minister or priest when experiencing mental health problems. Mixed AI/AN-Native Hawaiians were similar to Native Hawaiians regarding Native Hawaiian culture (i.e., going to see a Native Hawaiian healer, maintaining and valuing Native Hawaiian traditions and beliefs) and had higher levels of Native Hawaiian cultural identification than AI/ANs and the Other ethnic group.

Limitations

There were several limitations of the study. The data were from the early to mid- 1990s—approximately 20 years ago. The data set was utilized because it constituted the only large existing database that included a sufficient number of AI/ANs to compare to other ethnic groups. The methodological question becomes, “Has there been any major event or trend since the 1990s that would make the results different if the same study was conducted at present?” One large and growing movement that actually started in the 1960s and 1970s has been the Native Hawaiian Renaissance (e.g., Tsai, 2009). This movement has fostered greater awareness of past injustices (e.g., overthrow of the Native Hawaiian monarchy), increased pride in Native Hawaiian culture (including greater use of the Native Hawaiian language), and resulted in concrete advances for Native Hawaiians (e.g., immersion charter schools). In this regard, Native Hawaiian cultural identification has likely increased across the past half century. However, it is difficult to determine how this movement has impacted AI/AN cultural identification in Hawai‘i. Therefore, replication with a more contemporary study is certainly warranted. Although the database included a sufficient number of AI/ANs for group comparisons, the relative group sizes were disparate. In particular, there were 287 AI/ANs, 614 mixed AI/AN-Native Hawaiians, 4,219 Native Hawaiians, and 2,094 in the Other ethnic group. Therefore, there was more statistical power to detect differences among pair-wise comparisons that involved the Native Hawaiians and Other ethnic group. Although the variance accounted for (R^2) was 16.4% for the variable of maintaining Native Hawaiian traditions and was 13.4% for valuing Native Hawaiian beliefs, behaviors, and attitudes, none of the remaining variances accounted for was more than 4.7%. This suggests that, in addition to ethnicity, future research should include variables more salient to predicting outcomes, such as physical health and mental health factors. Some of the prevalences were relatively small. For example, the prevalences for foster parents being the most important persons who brought up the adolescents were 2.5% of AI/ANs, 1.3% of mixed AI/AN-Native Hawaiians, 0.5% of Native Hawaiians, and 1.0% of the Other ethnic group. However, despite these rather small percent differences, when subjected to inferential statistical tests, these differences were statistically significant. Finally, because this study was relatively unique in examining AI/AN youth in Hawai‘i, we were more concerned about making Type II errors than Type I errors. Therefore, we set alpha = .05 for all tests. However, to protect against Type I errors to some extent, we first performed overall inferential statistical tests, and only if these were statistically significant did we go further and test individual pair-wise comparisons.

Implications

Despite the limitations indicated above, this is the first large-scale empirical study of AI/AN adolescents in Hawaiʻi. With the cautions delineated above, there are several implications of the findings. On the one hand, AI/AN youth appeared to be open to different avenues of support, including more informal social network (e.g., family, friends) and alternative-complementary interventions (e.g., church minister, priest). These avenues could be viewed as protective factors for both prevention and intervention to maintain and improve mental health well-being and resiliency for not only AI/AN youth, but also for immigrant minority groups. On the other hand, although open to these supports, AI/AN youth may have less overall access to these varied supports given their more non-traditional family circumstances (e.g., smaller social networks, less extended family) in Hawaiʻi.

Given the above, AI/ANs in Hawaiʻi may need more creative and/or targeted assistance to address some of the social and well-being disparities that the present study found. The prevention and intervention efforts should be culturally appropriate and “bottom-up” (i.e., community-based) in approach (Allen et al., 2011; Gone & Trimble, 2012; Goodkind et al., 2010; Novins & Bess, 2011), taking into account the unique circumstances AI/AN youth experience in Hawaiʻi, including the large majority (90.5%) being of mixed ancestry (versus 23.6% in Hawaiʻi). Consideration should be given for these efforts to be introduced in multiple and even non-traditional settings to maximize success, especially given that school connectedness may be lower. Positive, strength-based youth developmental approaches should be utilized (Allen et al., 2011; Antonio & Chung-Do, 2015). Such settings could include more traditional environments (e.g., one-on-one therapy), but also non-traditional venues (e.g., in schools, at churches, in the community; Castagno & Brayboy, 2008), including the use of technology (e.g., telepsychiatry), especially for underserved areas (e.g., neighbor islands).

For example, prevention initiatives could be implemented in settings where AI/AN youth are and where such programs can be institutionalized (e.g., in schools). As one example, Kailua High School, on the island of Oʻahu, is one of the pioneers in the development, implementation, and institutionalization of an Ethnic Studies course that emphasizes learning about other cultures firsthand and teaches tolerance and respect for individual and group differences (Makaiau, 2010; Rehuher, Momohara, Sugimoto-Matsuda, & Hishinuma, 2008). Similarities and differences between the indigenous groups of Native Hawaiians and AI/ANs can also be incorporated into prevention and intervention efforts. Native Hawaiians and AI/ANs are both indigenous populations that have high proportions of mixed ancestry in Hawaiʻi, while Native Hawaiians are in their homeland with larger social networks, and AI/ANs have immigrated to Hawaiʻi and have smaller social networks.

In addition, however, it is important to address more macro historical, political, and sociological issues that may more likely impact all indigenous youth, including AI/ANs and Native Hawaiian adolescents, as noted in the AI/AN literature (e.g., Campbell & Evans-Campbell, 2011; Center for Native American Youth, 2016; Gone & Trimble, 2012; Goodkind et al., 2010; Sequist, 2017). These issues include a health care system that fosters health disparities, a lack of apology and restitution for past transgressions against AI/ANs, historical trauma of colonization, a need for education of the larger society regarding AI/AN well-being, and limited development and institutionalization of culturally relevant services. As we enter into an era of greater social awareness of indigenous values (e.g., harmony and balance with nature) and rights (e.g., Dakota Access Pipeline), accompanying this is the recognition of the importance of perspectives from a more indigenous and collectivistic viewpoint to improve well-being. Although the purpose of the present study was to compare and contrast AI/AN youth from non-AI/AN adolescents, AI/AN and Native Hawaiian youth share substantial commonalities, especially when the adolescents are of both indigenous ancestries. Such commonalities should be viewed as strengths rather than weaknesses and ways to further subdivide our youth.

Future qualitative (e.g., interviews, focus groups) and quantitative (e.g., surveys, epidemiologic studies, interventions) research should be considered that address AI/AN well-being: cultural identification (including of mixed identity; Markstorm et al., 2011; Snipp & Saraff, 2011) and cultural influences (e.g., holistic mind-body approach), risk-protective factors, strength-based positive youth-family development, potential prevention and intervention efforts, and workforce (e.g., lack of traditional AI/AN healers in Hawaiʻi). At present, there does not exist a youth AI/AN cultural identification scale tailored to AI/AN youth in Hawaiʻi who are more likely to be of mixed ancestry. Such a scale may provide greater insight into the role of culture for AI/AN youth in Hawaiʻi.

REFERENCES

Ackerson, L. M., Wiegman-Dick, R., Manson, S., & Baron, A. (1990). Properties of the inventory to diagnose depression in American Indian adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 29*(4), 601-607. http://dx.doi.org/10.1097/00004583-199007000-00014

Allen, J., Mohatt, G. V., Rasmus, S. M., Two Dogs, R., Ford, T., … & Camp, R. M. (2011). Cultural interventions for American Indian and Alaska Native youth: The Elluam Tungiinun and Nagi Kicopi Programs. In M. C. Sarche, P. Spicer, P. Farrell, & H. E. Fitzgerald (Eds.). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment* (pp. 337-364). Santa Barbara, CA: Praeger.

American and Alaska Native Mental Health Research. (1994). Calling from the rim: Suicidal behavior among American Indian and Alaska Native adolescents. *American and Alaska Native Mental Health Research, 4*, 1-279. http://dx.doi.org/10.5820/aian.mono04.1994.in

Andrade, N. N., Hishinuma, E. S., McDermott, Jr., J. F., Johnson, R. C., Goebert, D. A., … & Waldron, J. A. (2006). The National Center on Indigenous Hawaiian Behavioral Health study of prevalence of psychiatric disorders in Native Hawaiian adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*(1), 26-36. http://dx.doi.org/10.1097/01.chi.0000184933.71917.f4

Andrews, J., Lewinsohn, P., Hops, H., & Roberts, R. (1993). Psychometric properties of scales for the measurement of psychosocial variables associated with depression in adolescence. *Psychological Reports, 73*, 1019-1046. http://dx.doi.org/10.2466/pr0.1993.73.3.1019

Antonio, M. C. K., & Chung-Do, J. J. (2015). Systematic review of interventions focusing on Indigenous adolescent mental health and substance use. *American Indian and Alaska Native Mental Health Research*, *22*(3), 36-56. http://dx.doi.org/10.5820/aian.2203.2015.36

Campbell, C. D., & Evans-Campbell, T. (2011). Historical trauma and Native American child development and mental health: An overview. In M. C. Sarche, P. Spicer, P. Farrell, & H. E. Fitzgerald (Eds.). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment* (pp. 1-26). Santa Barbara, CA: Praeger.

Castagno, A. E., & Brayboy, B. M. J. (2008). Culturally responsive schooling for indigenous youth: A review of the literature. *Review of Educational Research*, *78*(4), 941-993. http://dx.doi.org/10.3102/0034654308323036

Center for Native American Youth. (2016). *State of Native Youth Report: Drawing strength from our cultures: The state of Native youth, 2016.* Washington, DC: Center for Native American Youth at The Aspen Institute. Retrieved from http://www.cnay.org/docs/state-of-native-youth-report-2016-web-spread.pdf

Choi-Misailidis, S., & Kaulukukui, C. M. (2004). Kūkulu i nā Hūlili: Building bridges to the understanding of Native Hawaiian mental health. *Hūlili: Multidisciplinary Research on Hawaiian Well-Being, 1*(1), 223-239. Retrieved from http://www.ulukau.org/elib/collect/hulili04/index/assoc/D0.dir/doc242.pdf

Gone, J. P., & Trimble, J. E. (2012). American Indian and Alaska Native mental health: Diverse perspectives on enduring disparities. *Annual Review of Clinical Psychology, 8*, 131-160. http://dx.doi.org/10.1146/annurev-clinpsy-032511-143127

Goodkind, J. R., Ross-Toledo, K., John, S., Hall, J. L., Ross, L., … & Lee, C. (2010). Promoting healing and restoring trust: Policy recommendations for improving behavioral health care for American Indian/Alaska Native adolescent. *American Journal of Community Psychology, 46*, 386-394. http://dx.doi.org/10.1007/s10464-010-9347-4

Hishinuma, E. S., Chang, J. Y., Goebert, D. A., Else, I. R. N., Nishimura, S. T., … & Jones, L. M. (2005). Prevalence of victims of violence among ethnically diverse Asian/Pacific Islanders. *Violence and Victims, 20*(5), 561-575. http://dx.doi.org/10.1891/vivi.2005.20.5.561

Kamehameha Schools. (2014). *Ka Huakaʻi: Native Hawaiian educational assessment, 2014.*Honolulu, HI: Kamehameha Schools. Retrieved from http://www.ksbe.edu/_assets/spi/pdfs/kh/Ka_Huakai_2014.pdf

Makaiau, A. (2010, May). *Adolescent identity exploration in a multicultural community context: An educator's approach to rethinking psychological identity interventions.* Unpublished dissertation, University of Hawaiʻi at Mānoa.

Markstrom, C. A., Whitesell, N., & Galliher, R. V. (2011). Ethnic identity and mental health among American Indian and Alaska Native adolescents. In M. C. Sarche, P. Spicer, P. Farrell, & H. E. Fitzgerald (Eds.). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment* (pp. 101-131). Santa Barbara, CA: Praeger.

Nahulu, L. B., Andrade, N. N., Makini, Jr., G. K., Yuen, N. Y. C., McDermott, Jr., J. F., … & Waldron, J. A. (1996). Psychosocial risk and protective influences in Hawaiian adolescent psychopathology. *Cultural Diversity and Mental Health, 2*(2), 107-114. http://dx.doi.org/10.1037/1099-9809.2.2.107

National Congress of American Indians. (n.d.). *An introduction to Indian Nations in the United States.* Washington, DC: National Congress of American Indians. Retrieved from http://www.ncai.org/about-tribes/indians_101.pdf

Novins, D. K., & Bess, G. (2011). Systems of mental health care for American Indian and Alaska Native children and adolescents. In M. C. Sarche, P. Spicer, P. Farrell, & H. E. Fitzgerald (Eds.). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment* (pp. 189-203). Santa Barbara, CA: Praeger.

Office of Hawaiian Affairs. (2015). *Native Hawaiian data book: Wiki Native Hawaiian data.* Retrieved from http://www.ohadatabook.com/INC01.pdf

Procidano, M., & Heller, K. (1983). Measures of perceived social support from friends and from family: Three validation studies. *American Journal of Community Psychology*, *11*, 1-24. http://dx.doi.org/10.1007/BF00898416

Rehuher, D., Momohara, C., Sugimoto-Matsuda, J., & Hishinuma, E. S. (2008). *Ethnic studies course evaluation, 2007-2008: Technical report.* Honolulu, HI: Asian/Pacific Islander Youth Violence Prevention Center, Department of Psychiatry, University of Hawaiʻi at Mānoa.

Sarche, M. C., Spicer, P., Farrell, P., & Fitzgerald, H. E. (Eds.). (2011). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment.* Santa Barbara, CA: Praeger.

Sequist, T. D. (2017). Urgent action needed on health inequities among American Indians and Alaska Natives. *Lancet*, *389,* 1378-1379. http://dx.doi.org/10.1016/S0140-6736(17)30883-8

Snipp, M., & Saraff, A. (2011). American Indian and Alaska Native children and families: Social and economic conditions. In M. C. Sarche, P. Spicer, P. Farrell, & H. E. Fitzgerald (Eds.). *American Indian and Alaska Native children and mental health: Development, context, prevention, and treatment* (pp. 27-42). Santa Barbara, CA: Praeger.

Tsai, M. (2009, August 9). Pride in Hawaiian culture reawakened. *Honolulu Advertiser,* p. A6.

U.S. Census Bureau. (2000). *Aloha counts: Census 2000 special tabulations for native Hawaiians.* Washington, DC: Author. Retrieved from http://ulukau.org/elib/cgi-bin/library?c=census00&l=en

U.S. Census Bureau. (2011-2013). *S0201: Selected population profile in the United States [Data]. 2011-2013 American Community Survey 3-Year Estimates*. Retrieved from https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

U.S. Census Bureau. (2015). *Race and Hispanic or Latino origin: 2010.* Retrieved from http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF

Whitbeck, L. B., Walls, M., & Hartshorn, K. (2014). *Indigenous adolescent development: Psychological, social and historical contexts.* New York: Routledge.

FUNDING INFORMATION AND ACKNOWLEDGEMENTS

This manuscript was supported by the Research Centers in Minority Institutions (RCMI) Supplement, National Institutes of Health (NIH; RR0361-06S1) and the National Institute of Mental Health (NIMH; R24 MH5015-01, R24 MH57079-A1). The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of the funding agencies. The authors would also like to express their appreciation to the researchers and administrators of the National Center on Indigenous Hawaiian Behavioral Health (NCIHBH) and Department of Psychiatry, University of Hawaiʻi at Mānoa.

AUTHOR INFORMATION

Dr. Sean W. Munnelly is an assistant professor in the Department of Psychiatry at the University of Hawaiʻi at Mānoa in Honolulu, HI.

Dr. Earl S. Hishinuma is a professor in the Department of Psychiatry at the University of Hawaiʻi at Mānoa in Honolulu, HI.

Mark Lee is a medical student at Cornell Medical School in New York, NY.

Myra D. Smith is a research statistician for the Department of Psychiatry at the University of Hawaiʻi at Mānoa in Honolulu, HI, and data management analyst III for the University of Florida, Gainesville, FL.

Kayne McCarthy is a Quality Improvement Data Analyst at Central Washington Comprehensive Mental Health in Yakima, WA.

Appendix A. Variable Outcome Tables

Table A1
Categorical Variable Outcomes

	Variable		Value	Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
				N	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	Over-all R^{2b}	N	p[c]	Multiple Comparisons (2x2 Crosstabs)[d]
Demographic	In your family, who is the main wage earner (bread-winner, who brings the main money support into the family)? [Note: Implied forced-choice but many chose more than one option]	Biological mother	Yes	2,654	38.3	122	44.5	257	43.3	1,524	37.5	751	37.5	‡	6,933	**	A & AH > H & O
		Biological father	Yes	4,001	57.7	115	42.0	321	54.1	2,364	58.2	1,201	60.0		6,933	****	AH, H & O > A; O > AH
		Stepmother	Yes	58	0.8	4	1.5	6	1.0	30	0.7	18	0.9		6,933		
		Stepfather	Yes	498	7.2	41	15.0	36	6.1	287	7.1	134	6.7		6,933	****	A > AH, H & O
		Grandmother	Yes	189	2.7	5	1.8	14	2.4	146	3.6	24	1.2		6,933	****	AH & H > O
		Grandfather	Yes	197	2.8	7	2.6	25	4.2	137	3.4	28	1.4		6,933	****	AH & H > O
		Aunt	Yes	95	1.4	3	1.1	6	1.0	49	1.2	37	1.9		6,933		
		Uncle	Yes	109	1.6	6	2.2	12	2.0	56	1.4	35	1.8		6,933		
		Foster parents	Yes	36	0.5	5	1.8	6	1.0	12	0.3	13	0.7		6,933	***	A > O > H; AH > H
		Sibling (brother or sister)	Yes	83	1.2	2	0.7	7	1.2	43	1.1	31	1.6		6,933		
		Hanai parents	Yes	45	0.7	1	0.4	12	2.0	26	0.6	6	0.3		6,933	****	AH > H & O
		Other	Yes	94	1.4	3	1.1	9	1.5	59	1.5	23	1.2		6,933		
	How much school did the main wage earner have?	8th grade or less		164	2.5	6	2.3	13	2.3	66	1.7	79	4.2	.040	6,570	****	O > AH & H
		Some high school		466	7.1	19	7.2	49	8.6	280	7.2	118	6.3		6,570		
		High school graduate/ GED[e]		1,872	28.5	70	26.4	162	28.6	1,285	33.2	355	19.0		6,570	****	H > A & AH > O

continued on next page

Table A1
Categorical Variable Outcomes

													Two-Way χ²			
			Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Multiple Comparisons (2x4 Crosstabs)			
	Variable	**Value**	***N***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	**Over-all *R*²**[b]	***N***	***p***[c]	**Multiple Comparisons (2x2 Crosstabs)**[d]
	How much school did the main wage earner have? (continued)	Some college or community college	1,633	24.9	65	24.5	155	27.3	991	25.6	422	22.5		6,570	*	AH & H > O
		College graduate	1,589	24.2	57	21.5	101	17.8	825	21.3	606	32.4		6,570	****	O > A, AH & H
		Master's degree	662	10.1	38	14.3	73	12.9	347	9.0	204	10.9		6,570	***	A, AH & O > H
		Doctoral degree (Ph.D., Medical, Law)	184	2.8	10	3.8	14	2.5	72	1.9	88	4.7		6,570	****	A & O > H; O > AH
Demographic	For the wage earner checked above, what is his/her source of income?	Employed, part-time	448	6.6	26	9.6	41	7.1	256	6.5	125	6.4	.015	6,762		
		Employed, full-time	5,028	74.4	160	59.3	419	72.6	3,054	77.0	1,395	71.6		6,762	****	H > AH & O > A
		Unemployed	72	1.1	6	2.2	6	1.0	43	1.1	17	0.9		6,762		
		Welfare	166	2.5	16	5.9	24	4.2	92	2.3	34	1.7		6,762	****	A & AH > H & O
		Self-employed/ own business or farm	816	12.1	45	16.7	62	10.8	393	9.9	316	16.2		6,762	****	A & O > AH & H
		Retired	165	2.4	12	4.4	17	3.0	92	2.3	44	2.3		6,762		
		Disability	67	1.0	5	1.9	8	1.4	36	0.9	18	0.9		6,762		

continued on next page

Table A1
Categorical Variable Outcomes

				Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
	Variable		Value	*N*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	Over-all R^{2b}	*N*	*p* [c]	Multiple Comparisons (2x2 Crosstabs)[d]
Demographic	Is the person(s) who is the main wage earner and/or brought you up a veteran (someone who used to be in the military)?	Yes		2,079	30.0	86	31.3	202	34.0	1,235	30.5	556	27.7	.003	6,928	*	AH & H > O
		No		4,102	59.2	168	61.1	325	54.7	2,405	59.4	1,204	59.9		6,928		
		Not sure		747	10.8	21	7.6	67	11.3	408	10.1	251	12.5		6,928	*	O > A & H
Social	Who is/are the most important person(s) who brought you up? (check all that apply)	Biological mother	Yes	6,328	89.2	250	89.0	528	86.4	3,694	89.0	1,856	90.5	‡	7,095	*	O > AH
		Biological father	Yes	5,121	72.2	164	58.4	413	67.6	3,004	72.3	1,540	75.1		7,095	****	O > H > AH > A
		Stepmother	Yes	145	2.0	5	1.8	18	3.0	72	1.7	50	2.4		7,095		
		Stepfather	Yes	494	7.0	41	14.6	49	8.0	271	6.5	133	6.5		7,095	****	A > AH, H & O
		Grandmother	Yes	2,223	31.3	55	19.6	199	32.6	1,447	34.8	522	25.5		7,095	****	AH & H > O > A
		Grandfather	Yes	1,490	21.0	34	12.1	126	20.6	962	23.2	368	18.0		7,095	****	AH, H & O > A; H > O
		Aunt	Yes	901	12.7	21	7.5	82	13.4	578	13.9	220	10.7		7,095	***	AH & H > A; H > O
		Uncle	Yes	667	9.4	17	6.1	57	9.3	413	9.9	180	8.8		7,095		
		Foster parents	Yes	54	0.8	7	2.5	8	1.3	19	0.5	20	1.0		7,095	***	A, AH & O > H; A > O
		Sibling (brother or sister)	Yes	955	13.5	38	13.5	80	13.1	515	12.4	322	15.7		7,095	**	O > H
		Hanai[e] parents	Yes	114	1.6	4	1.4	19	3.1	75	1.8	16	0.8		7,095	***	AH > H > O
		Other	Yes	269	3.8	8	2.9	31	5.1	160	3.9	70	3.4		7,095		

continued on next page

Table A1
Categorical Variable Outcomes

				Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
	Variable		Value	*N*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	Over-all R^{2b}	*N*	p[c]	Multiple Comparisons (2x2 Crosstabs)[d]
Social	From the person(s) you chose above, who achieved the highest educational level? [Note: Implied forced-choice but many chose more than one option]	Biological mother	Yes	3,681	53.9	159	57.6	321	54.3	2,193	54.9	1,008	51.4	‡	6,825	*	H > O
		Biological father	Yes	2,760	40.4	91	33.0	217	36.7	1,579	39.5	873	44.5		6,825	****	H > A; O > A, AH & H
		Stepmother	Yes	63	0.9	2	0.7	9	1.5	29	0.7	23	1.2		6,825		
		Stepfather	Yes	212	3.1	22	8.0	22	3.7	112	2.8	56	2.9		6,825	****	A > AH, H & O
		Grandmother	Yes	374	5.5	7	2.5	43	7.3	264	6.6	60	3.1		6,825	****	AH & H > A & O
		Grandfather	Yes	315	4.6	4	1.5	32	5.4	220	5.5	59	3.0		6,825	****	AH & H > A & O
		Aunt	Yes	319	4.7	9	3.3	29	4.9	192	4.8	89	4.5		6,825		
		Uncle	Yes	242	3.6	9	3.3	21	3.6	147	3.7	65	3.3		6,825		
		Foster parents	Yes	26	0.4	3	1.1	5	0.9	10	0.3	8	0.4		6,825	*	A & AH > H
		Sibling (brother or sister)	Yes	313	4.6	13	4.7	21	3.6	169	4.2	110	5.6		6,825		
		Hanai[e] parents	Yes	41	0.6	2	0.7	9	1.5	23	0.6	7	0.4		6,825	*	AH > H & O
		Other	Yes	93	1.4	3	1.1	6	1.0	57	1.4	27	1.4		6,825		
	What is his/her educational level?	8th grade or less		67	1.0	1	0.4	9	1.5	17	0.4	40	2.1	.037	6,688	****	AH & O > H
		Some high school		283	4.2	14	5.2	26	4.4	148	3.8	95	5.0		6,688		

continued on next page

Table A1
Categorical Variable Outcomes

				Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
	Variable		Value	*N*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	*n*	%[a]	Over-all R^2[b]	*N*	*p* [c]	Multiple Comparisons (2x2 Crosstabs)[d]
Social	What is his/her educational level? (continued)	High school graduate or GED[f]		1,378	20.6	49	18.2	115	19.6	960	24.5	254	13.2		6,688	****	H > A & AH > O
		Some college or community college		1,814	27.1	80	29.6	179	30.6	1,135	29.0	420	21.9		6,688	****	A, AH & H > O
		College graduate		1,959	29.3	66	24.4	133	22.7	1,037	26.5	723	37.7		6,688	****	O > A, AH & H
		Master's degree		927	13.9	49	18.2	100	17.1	497	12.7	281	14.7		6,688	**	A, AH & O > H
		Doctoral degree (Ph.D., Medical, Law)		260	3.9	11	4.1	24	4.1	120	3.1	105	5.5		6,688	***	O > H
	Besides your parents, what relatives do you see frequently? (check all that apply)	Maternal grandfather (mother's father)	Yes	2,164	32.8	58	24.7	167	29.3	1,326	33.6	613	33.4	‡	6,592	**	H > A & AH; O > A
		Paternal grandfather (father's father)	Yes	1,493	22.7	37	15.7	138	24.2	905	22.9	413	22.5		6,592		
		Maternal grandmother (mother's mother)	Yes	3,188	48.4	98	41.7	272	47.6	1,982	50.2	836	45.5		6,592	**	H > A & O

continued on next page

Table A1
Categorical Variable Outcomes

				Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
	Variable		**Value**	***N***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	**Over-all *R^2*[b]**	***N***	***p*** [c]	**Multiple Comparisons (2x2 Crosstabs)**[d]
Social	Besides your parents, what relatives do you see frequently? (check all that apply) (continued)	Paternal grandmother (father's mother)	Yes	2,222	33.7	63	26.8	192	33.6	1,378	34.9	589	32.1		6,592	*	H > A & O
		Grandfather (hanai[e])	Yes	224	3.4	9	3.8	23	4.0	134	3.4	58	3.2		6,592		
		Grandmother (hanai[e])	Yes	268	4.1	9	3.8	35	6.1	151	3.8	73	4.0		6,592		
		Uncles	Yes	3,491	53.0	120	51.1	327	57.3	2,169	54.9	875	47.6		6,592	****	AH & H > O
		Aunts	Yes	3,828	58.1	124	52.8	351	61.5	2,391	60.6	962	52.4		6,592	****	AH & H > A & O
		Cousins	Yes	3,525	53.5	115	48.9	320	56.0	2,171	55.0	919	50.0		6,592	**	AH & H > O
		Other	Yes	696	10.6	35	14.9	66	11.6	411	10.4	184	10.0		6,592		
Academic	My educational goal is to: ______	Drop out of school		25	0.4	3	1.1	8	1.3	10	0.2	4	0.2	.007	7,139	****	A & AH > H & O
		Graduate from high school		1,390	19.5	57	20.4	114	18.9	869	20.8	350	16.8		7,139	**	H > O
		Graduate from a technical school or two-year college		875	12.3	49	17.6	75	12.4	474	11.4	277	13.3		7,139	**	A > AH & H; O > H

continued on next page

Table A1
Categorical Variable Outcomes

													Two-Way χ^2			
			Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Multiple Comparisons (2x4 Crosstabs)			
	Variable	**Value**	***N***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	**Over-all R^2**[b]	***N***	***p*** [c]	**Multiple Comparisons (2x2 Crosstabs)**[d]
Academic	My educational goal is to: ______ (continued)	Graduate from a four-year college	3,876	54.3	138	49.5	325	53.8	2,252	53.9	1,161	55.8		7,139		
		Receive graduate training	973	13.6	32	11.5	82	13.6	572	13.7	287	13.8		7,139		
Mental Health	When you have mental or emotional problems, who would you prefer to see for help (check only one)?	Doctor	2,104	33.3	73	30.8	188	33.7	1,291	34.4	552	31.1	.047	6,326		
		Nurse	677	10.7	19	8.0	84	15.1	468	12.5	106	6.0		6,326	****	AH & H > A & O
		Native Hawaiian healer (kahuna lapa 'au)	700	11.1	19	8.0	83	14.9	519	13.8	79	4.4		6,326	****	AH & H > A > O
		Teacher or school counselor	2,137	33.8	82	34.6	142	25.5	1,111	29.6	802	45.1		6,326	****	O > A & H > AH
		Church minister or priest	708	11.2	44	18.6	61	10.9	364	9.7	239	13.4		6,326	****	A > O > H; A > AH

continued on next page

Table A1
Categorical Variable Outcomes

													Two-Way χ^2			
			Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Multiple Comparisons (2x4 Crosstabs)			
	Variable	Value	N	%[a]	n	%[a]	n	%[a]	n	%[a]	n	%[a]	Over-all R^{2b}	N	p[c]	Multiple Comparisons (2x2 Crosstabs)[d]
Mental Health	Have you had any serious personal, emotional, behavioral, or mental health problems for which you felt you needed special help or counseling during the past 6 months? (circle only one)	Yes, and I did seek special help	458	6.5	23	8.2	63	10.4	279	6.8	93	4.6	.007	7,048	****	AH > H > O; A > O
		Yes, but I did not seek special help	772	11.0	36	12.8	88	14.5	447	10.8	201	9.9		7,048	*	AH > H & O
		I have had very few personal problems of any serious concern	2,609	37.0	104	36.9	225	37.1	1,541	37.3	739	36.5		7,048		
		I have not been bothered at all by personal problems during the past 6 months	3,209	45.5	119	42.2	231	38.1	1,867	45.2	992	49.0		7,048	****	O > A, AH & H; H > AH
	Do you discuss any of your problems with any members of your family or friends? (circle only one)	Yes, and it helps a lot	2,344	33.2	92	32.7	196	32.4	1,419	34.3	637	31.2	.004	7,064		
		Yes, and it helps some	2,636	37.3	91	32.4	230	38.0	1,554	37.6	761	37.2		7,064		

continued on next page

Table A1
Categorical Variable Outcomes

			Total		Full or Part AI/AN (A)		Part AI/AN & Native Hawaiian (AH)		Full or Part Native Hawaiian (H)		Not AI/AN or Native Hawaiian (O)		Two-Way χ^2 Multiple Comparisons (2x4 Crosstabs)			
	Variable	**Value**	***N***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	***n***	**%**[a]	**Over-all R^2**[b]	***N***	***p***[c]	**Multiple Comparisons (2x2 Crosstabs)**[d]
Mental Health	Do you discuss any of your problems with any members of your family or friends? (circle only one) (continued)	Yes, but it does not help at all	316	4.5	21	7.5	35	5.8	170	4.1	90	4.4		7,064	*	A > H & O
		No, I do not have anyone I can talk with about my problems	155	2.2	9	3.2	13	2.2	85	2.1	48	2.4		7,064		
		No, no one cares to hear about my problems	110	1.6	4	1.4	9	1.5	63	1.5	34	1.7		7,064		
		No, I do not care to talk about my problems with anyone	822	11.6	36	12.8	70	11.6	482	11.7	234	11.5		7,064		
		No, I do not have any problems	681	9.6	28	10.0	52	8.6	361	8.7	240	11.7		7,064	**	O > AH & H

Note: AI/AN = American Indian or Alaska Native. All overall one-way chi-square analyses were statistically significant ($p < .05$)

*$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$

[a] Column percents

[b] Square of the phi coefficient for interaction

[c] Two-way multiple comparisons (2x4) were performed only if the overall two-way chi-square test was statistically significant; all overall two-way chi-square tests were statistically significant ($p < .05$)

[d] Two-way multiple comparisons (2x2) were performed only if the two-way multiple comparisons (2x4) were statistically significant ($p < .05$)

[e] formally or informally adopted

[f] General Educational Development

[‡] Overall two-way chi-square tests were not conducted for these variables because individuals belonged to more than one category

Table A2
Continuous Variable Outcomes

		Total			Full or Part AI/AN (A)			Part AI/AN & Native Hawaiian (AH)			Full or Part Native Hawaiian (H)			Not AI/AN or Native Hawaiian (O)					
	Variable	**Mean**	***SD***	***N***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	***R^2***	***P***	**Pairwise Multiple Comparison[a]**
Demographic	How long have you lived on this island?	12.9	4.7	6,945	10.5	5.3	273	12.9	4.6	584	13.4	4.3	4,053	12.2	5.2	2,035	.024	****	H > AH > O > A
Social	How many people live in your home?	5.2	2.2	2,772	4.8	2.1	120	5.3	2.4	261	5.3	2.3	1,699	4.7	2.0	692	.014	****	AH & H > A & O
	How much do your parents expect of you?[b]	4.0	0.9	7,145	4.0	0.9	283	4.0	0.9	611	4.0	0.8	4,177	4.0	0.9	2,074	.001		
	Perceived Social Support from Family Scale (average score of completed items)[c]	3.6	0.9	6,596	3.5	0.9	265	3.6	0.9	565	3.7	0.9	3,760	3.5	0.9	2,006	.006	****	H > A & O; AH > O
	Perceived Social Support from Friend Scale (averaged score of completed items)[c]	3.9	0.8	6,623	3.8	0.8	265	3.9	0.8	567	3.9	0.7	3,786	3.8	0.8	2,005	.006	****	H > A, AH & O
Academic	Compared with your classmates, how well do you do in school?[d]	3.3	0.7	7,134	3.2	0.7	284	3.2	0.7	607	3.3	0.7	4,175	3.4	0.7	2,068	.007	****	O > A, AH & H
	On the average, what were your grades on your last report card?[e]	2.8	0.8	6,640	2.6	0.8	259	2.7	0.8	555	2.7	0.7	3,880	2.9	0.8	1,946	.007	****	O > H > A & AH

continued on next page

Table A2
Continuous Variable Outcomes

		Total			Full or Part AI/AN (A)			Part AI/AN & Native Hawaiian (AH)			Full or Part Native Hawaiian (H)			Not AI/AN or Native Hawaiian (O)					
	Variable	**Mean**	***SD***	***N***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	***R*** ^{2}	***P***	**Pairwise Multiple Comparison**[a]
Academic	How do you feel about going to school?[f]	2.6	1.0	7,181	2.8	1.0	285	2.7	1.0	612	2.6	1.0	4,199	2.6	1.0	2,085	.002	***	A & AH > H & O
	What are the chances that you will complete this school year?[g]	4.5	0.8	7,177	4.4	0.9	285	4.4	0.9	610	4.5	0.8	4,201	4.5	0.8	2,081	.002	**	O > A, AH & H
	What are the chances that you will get a high school diploma?[e]	4.5	0.8	7,178	4.4	1.0	285	4.4	0.9	610	4.5	0.8	4,203	4.5	0.8	2,080	.001		
Physical Health	During the last month, how much has your physical health worried or concerned you?[h]	2.5	1.2	7,151	2.3	1.3	282	2.5	1.3	611	2.5	1.2	4,186	2.4	1.2	2,072	.002	**	AH & H > A & O
	Do you think you are healthier than most people your age, not as healthy as most of them or do you think that your health is just about the same as most people your age?[i]	3.3	0.9	7,135	3.3	1.0	280	3.3	0.9	612	3.3	0.9	4,188	3.3	0.9	2,055	.000		
	In the past 6 months, how many times have you gone to see a nurse or doctor?[j]	2.5	1.2	7,094	2.6	1.2	286	2.7	1.3	607	2.6	1.2	4,160	2.4	1.1	2,041	.005	****	A, AH & H > O

continued on next page

Table A2
Continuous Variable Outcomes

		Total			**Full or Part AI/AN (A)**			**Part AI/AN & Native Hawaiian (AH)**			**Full or Part Native Hawaiian (H)**			**Not AI/AN or Native Hawaiian (O)**					
	Variable	**Mean**	***SD***	***N***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	R^2	***P***	**Pairwise Multiple Comparison**[a]
Physical Health	During the past month of school, how many days were you absent because you were sick?[k]	1.9	1.1	7,136	2.1	1.2	286	2.0	1.2	612	1.9	1.2	4,179	1.9	1.1	2,059	.003	****	A, AH & H > O; A > H
Mental Health	During the last month, how much has your mental (emotional) health worried or concerned you?[h]	2.4	1.3	7,135	2.3	1.2	282	2.5	1.3	607	2.5	1.3	4,182	2.4	1.2	2,064	.002	**	AH & H > A & O
	When did you last have counseling (dormitory counselor, school counselor, testing for personal problems), or any other mental health service?[l]	2.5	1.6	7,016	2.5	1.6	281	2.9	1.7	599	2.6	1.7	4,126	2.1	1.5	2,010	.028	****	AH > A & H > O
Culture	In the past 6 months, how many times have you gone to see a Native Hawaiian healer (for example, a kahuna lapa 'au)?[j]	1.1	0.5	7,126	1.1	0.3	284	1.2	0.6	607	1.1	0.6	4,178	1.1	0.3	2,057	.009	****	AH & H > A & O
	How important is it to you to maintain Hawaiian cultural traditions?[m]	3.6	1.2	7,042	2.8	1.3	277	4.0	1.1	605	3.9	1.1	4,140	2.9	1.2	2,020	.164	****	AH & H > A & O

continued on next page

Table A2
Continuous Variable Outcomes

		Total			Full or Part AI/AN (A)			Part AI/AN & Native Hawaiian (AH)			Full or Part Native Hawaiian (H)			Not AI/AN or Native Hawaiian (O)					
	Variable	**Mean**	***SD***	***N***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**Mean**	***sd***	***n***	**R^2**	***P***	**Pairwise Multiple Comparison[a]**
Culture	How much do you value Hawaiian beliefs, behaviors and attitudes (circle one)[m]	3.5	1.2	7,065	3.0	1.2	281	3.9	1.0	606	3.8	1.1	4,144	2.9	1.1	2,034	.134	****	AH & H > A & O

Note: AI/AN = American Indian or Alaska Native

*$p < .05$, **$p < .01$, ***$p < .001$, ****$p < .0001$

[a] Pairwise multiple comparisons performed only if one-way analysis of variance (ANOVA) was statistically significant ($p < .05$)

[b] 1 = No Expectations, 5 = High Expectations

[c] This composite score was the average of available scores from six items. Each item in the scale had the following values: 1 = Always False, 2 = Often False, 3 = Neither True

[d] 1 = Much Below Average, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Much Above Average

[e] A = 4.0, A- = 3.7, B+ = 3.3, B = 3.0, B- = 2.7, C+ = 2.3, C = 2.0, C- = 1.7, D or less = 1.0, Don't know = missing score

[f] 1 = I like school very much, 2 = I like school quite a bit, 3 = I like school some, 4 = I don't like school very much, 5 = I hate school

[g] 1 = Not At All Likely, 3 = Fairly Likely, 5 = Highly Likely

[h] 1 = Not At All Concerned, 5 = Very Much Concerned

[i] 1 = Not As Healthy As Others, 3 = About The Same, 5 = Healthier Than Others

[j] 1 = Never, 2 = Once, 3 = Twice, 4 = 3-4 Times, 5 = 5 or More Times

[k] 1 = None, 2 = 1-2 Days, 3 = 3-4 Days, 4 = 5-7 Days, 5 = 8 Days or More

[l] 1 = Never, 2 = Over 2 Years Ago, 3 = 1-2 Years Ago, 4 = 6 Months - 1 Year Ago, 5 = Within the Last 6 Months

[m] 1 = Not at all, 3 = Somewhat, 5 = Very much

PHYSICAL ACTIVITY AMONG NAVAJO CANCER SURVIVORS: A QUALITATIVE STUDY

Jennifer W. Bea, PhD, Hendrik 'Dirk' de Heer, PhD, Luis Valdez, PhD,
Brian Kinslow, DPT, Etta Yazzie, RN, Mark C. Lee, Pearl Nez; Shelby Dalgai,
and Anna Schwartz, PhD

Abstract: Physical activity (PA) may improve quality of life and survival among cancer survivors; however, little is known about Navajo cancer survivor PA. We evaluated Navajo cancer survivor PA habits, barriers, and preferences through focus groups and interviews (n = 32). Transcripts were coded in NVivo and major themes summarized by consensus. Survivor exercise guidelines were largely unknown, but movement, resilience and life balance were valued. Most participants reported at ≥1 mode of current PA (n = 24; 71% walking, 46% work/homesteading). Barriers to PA included treatment side effects, limited access to programs, fear of "over doing it," and family/friends encouraging rest. Preferences for PA varied.

INTRODUCTION

Physical activity (PA) has been associated with improved cancer-free survival (Schmitz et al., 2010; World Cancer Research Fund/ American Institute for Cancer Research, 2007), including 30-60% reduction in recurrence and mortality of colorectal and breast cancers (Irwin et al., 2011; Irwin et al., 2008; Meyerhardt et al., 2006), as well as reduced fatigue and improved quality of life, body composition, body image, and physical function among cancer survivors (Schmitz et al., 2010). Moderate amounts of PA have been demonstrated to achieve these protective benefits, such as walking 30 minutes per day at about 2.5 miles per hour (Irwin et al., 2011). Unfortunately, studies have not typically included large diverse populations, and none of the studies were specifically focused on American Indian and Alaska Native (AI/AN) cancer survivors.

Significant cancer disparities exist among AI/AN populations for several cancers. From 2001 to 2009, overall cancer mortality rates decreased nationally for White populations, but went up for AI/AN men and women (Centers for Disease Control and Prevention, 2016). AI/AN populations have the lowest 5-year survival rates of any group with 59.0% and were the only group that did not see reductions in cancer mortality from 2001 to 2010 (Siegel, Ma, Zou, & Jemal, 2014). While the most common cancers among AI/AN populations are similar to national averages (lung, female breast, colorectal, and prostate cancer), death rates for certain cancers are more common among Native populations (gallbladder, stomach, liver, and kidney cancers) (White et al., 2014). Regional differences in incidence rates and outcomes across cancer types have been recognized, such that the most prevalent cancers and those with the highest mortality may differ among tribes (White et al., 2014).

The Navajo Nation has the second largest enrollment of any tribal nation (the largest being the Cherokee Nation), with a total enrollment of 332,129 according to the 2010 U.S. census, and 173,667 people living on the Navajo Nation reservation (U.S. Census Bureau, 2010). According to the most recent estimates from the Navajo Department of Epidemiology, cancer is the second leading cause of death among Navajo (behind only accidental injuries). With more than 500 deaths during 2006-2009, cancer accounted for approximately 12.7% of all deaths (Foley, Kinlacheeny, & Yazzie, 2016), with the most common cancers being breast, prostate, colorectal, and stomach cancer (Navajo Epidemiology Center, 2006).

Despite the size of the Navajo population and the aforementioned cancer disparities, research documenting the PA habits, barriers, and preferences of Navajo cancer survivors could not be identified in the literature. A better understanding of the factors related to PA is important to understanding the potential benefits of PA among Navajo cancer survivors. Further, cultural adaptation of successful evidence-based interventions may facilitate engagement and retention of participants in preventive interventions (Barrera, Berkel, & Castro, 2016).

Therefore, we conducted a qualitative study to assess current Navajo cancer survivor PA habits and potential barriers to engaging in adequate PA according to the American College of Sports Medicine (ACSM) guidelines for PA among cancer survivors (Schmitz et al., 2010). We also evaluated PA preferences in order to develop a tailored PA-based health promotion initiative in alignment with community beliefs and needs among Navajo cancer survivors.

METHODS

Study Population

Any adult Navajo with a history of cancer residing in the city of Flagstaff, AZ or in the selected rural Chapter on the Navajo Nation was eligible to participate in this study. Recent research has found that Navajo often move between rural and urban locations on and off the Navajo Nation (Hardy et al., In review). Both rural and urban sites were selected to ensure representation from these different environments in order to plan a physical activity intervention serving rural and urban sites based on the qualitative findings. Participants were recruited through flyers, direct contact by the Navajo oncology nurse on the research team, and word of mouth. Study recruitment and data collection occurred between May 2015 and December 2015. The study was explained in both Navajo and English prior to consent, depending on preferred language. All participants provided consent prior to study participation. The protocol for human subjects research was reviewed and approved by the University of Arizona Institutional Review Board, the Northern Arizona Institutional Review Board and the Navajo Nation Human Research Review Board prior to study initiation.

Data Collection

Interviews and focus groups were used to identify PA habits, barriers to engaging in adequate PA (Schmitz et al., 2010), and PA preferences among Navajo survivors of various cancers. An experienced bilingual (Navajo and English) facilitator, who is also an oncology nurse, used a standardized discussion guide to lead each type of interaction. The interactions began with a traditional introduction in Navajo and an explanation of the study in Navajo and English. The traditional Navajo introduction includes sharing clan name, hometown, and family lineage (i.e., names of mother, father, grandmother, and grandfather on both sides of the family). Once consented, participants gave a brief cancer history and demographics as a part of continued introduction to one another.

The discussion guide incorporated the theoretical frameworks of the PEN-3 (Airhihenbuwa, 1995) and Health Belief (HBM) models (Rosenstock, 1974) to try and understand Navajo cancer survivor's beliefs and barriers regarding cancer and PA. The PEN-3 model includes the following domains: Cultural Identity (Person, Extended Family, Neighborhood); Relationship and Expectation (Perceptions, Enablers, and Nurturers); Cultural Empowerment (Positive, Existential, and Negative; Iwelunmor, Newsome, & Airhihenbuwa, 2014). Similarly, the HBM model considers individual perceptions, knowledge, attitudes, and beliefs and takes into account community influences and cultural appropriateness (Rosenstock, 1974).

Based on these models, the discussion guide included questions about: a) definitions of cancer, PA, and perceived cancer causes; b) current PA and barriers to PA; c) preferences for delivery, type, and desired elements of existing PA programs, such as the ACSM Exercise Guidelines for Cancer Survivors (Schmitz et al., 2010); and d) ideas for program sustainability. The focus groups and interviews were intentionally semi-structured and open to allow participants to voluntarily raise important issues that may not have been raised by a more structured approach.

The focus groups took place in a conference room at either the Chapter House or the clinic (Arizona Oncology Associates, Flagstaff, Arizona). Participants sat in a circle for the discussion. Male and female focus groups were conducted separately to improve comfort with sharing details about cancer and cancer treatment-related issues, especially related to sex-specific cancers (e.g., prostate cancer and impotence; breast cancer and mastectomy, etc.). Interviews took place in a private room at the clinic or at the homes of individuals on the Navajo Nation to accommodate transportation issues.

Data Processing and Analysis

Audio recordings were used to document all focus groups and interview conversations, except for two participants where only field notes were taken based on participant preference. Recordings were translated from Navajo to English, as necessary, by a bilingual team member and reviewed by a second bilingual team member for concordance. All recordings were transcribed in full. Field notes were integrated into the data when recordings were not available.

A mixed deductive-inductive strategy was used to analyze transcripts. Data were first organized in NVivo by creating a framework of nodes based on the interview guide. These nodes served as a starting point and included broad categories based on the interview questions (i.e., cancer perceptions, barriers to activity, activity preferences, etc.). These nodes/categories were subsequently adjusted based on the data throughout the coding process. For example, categories were expanded upon (i.e., adding subcategories), or new categories were added that were not originally reflected in the broad framework. Coders were trained by the principal investigators. The first three transcripts were triple-coded independently by the coders (one Navajo; one Native, but not Navajo; and one non-Native coder). The coders iteratively read each transcript to identify reoccurring themes. Extensive discussions occurred regarding nodes/themes until team consensus was achieved for each node/theme. Since the coding between coders was concordant, only two coders were used for subsequent transcripts (one Navajo and one non-Native). After principal investigators approved the final coding, comparisons were made with the theoretical frameworks.

RESULTS

Participant Characteristics

We conducted 5 focus groups and 13 individual interviews among forty Navajo individuals (*n* = 32 survivors, *n* = 8 family/friends). Focus groups took place in both urban and rural settings. Interviews were primarily conducted in Flagstaff, AZ at the oncology clinic.

Both male (*n* = 13) and female (*n* = 19) cancer survivors participated in the focus groups and interviews (see Table 1), though focus groups were separated by gender. The mean age of the cancer survivors was 56.9 ± 12.3 years (males: 55.6±13.0 years; females: 57.3±11.8 years). The number of years since diagnosis was 4.7 ± 4.7 years (range ≤ 1 - 17 years). Many participants used both Navajo and English during discussions, though two individuals used Navajo primarily. The majority of participants had experienced colon (*n* = 10; 31%) or breast cancer (*n* = 10; 31%). The other solid tumor types diagnosed among the Navajo cancer survivors were ovarian (*n* = 2), cervical (*n* = 1), esophageal (*n* = 1), gall bladder (*n* = 2), gastric (*n* = 2), prostate (*n* = 1), and kidney (*n* = 1). The hematologic cancers were acute myeloid leukemia (*n* = 1) and multiple myeloma (*n* = 1).

Self-Reported Physical Activity

Most of the survivors (75%) reported at least one mode of current PA (24 active; 1 inactive; 7 did not specify). The PA modes varied, but the majority of participants walked at the time of the focus group or interview (71% of survivors who specified activities). Of the participants that discussed frequency of activity (*n* = 17), 82% engaged in daily activity, while the remainder engaged in PA 2-4 days/week. The walking/running distance ranged from one block to 3 miles. Other activities included biking (*n* = 2; distance not specified), physical therapy (*n* = 3), stretching (*n* = 1), and homesteading (*n* = 7), which may include tending to livestock and/or crops, hauling water, and other chores. Several individuals reported more than one PA. Two individuals reported only work-related activity outside the home without specific daily duration.

Table 1
Characteristics of Navajo cancer survivors participating in focus groups and interviews (*n* = 32)

Characteristic	Mean or N	%[f]
Age, years	56.9	12.3
Sex		
Male	13	41%
Female	19	59%
Primary Language		
English	30	94%
Navajo	2	6%
Cancer Site		
Breast	10	31%
Colon	10	31%
Gynecologic, excl. breast[a]	3	9%
Gastrointestinal, excl. colon[b]	5	16%
Other[c]	4	13%
Time since diagnosis, years[d]	4.7	4.7
Current types of exercise[e]		
Walking or Running	17	75%
Biking	2	8%
Stretching	1	4%
Tending livestock and homestead related chores	7	29%
Physical Therapy	3	13%
Work related	4	17%
None	1	4%

[a] Gynecologic, excluding breast cancer, represents ovarian (*n* = 2) and cervical cancers (*n* = 1); [b] gastrointestinal, excluding colon, represents esophageal (*n* = 1), gall bladder (*n* = 2), and gastric (*n* = 2); [c] prostate (*n* = 1), kidney (*n* = 1), hematologic cancers (*n* = 2); [d] based on year of diagnosis by self-report, not exact date; [e] some participants listed >1 type of activity, duration and frequency reported in less than half the sample. [f] Standard deviation rather than % for age; Missing data: Age: 3; Time since diagnosis: 7; Current types of exercise: 7.

Identified Themes

Four broad categories were identified in the remainder of the qualitative analysis: 1) perspectives of physical activity and cancer; 2) motivators for physical activity; 3) barriers to physical activity; and 4) preference for delivery, type, and desired elements of existing PA programs. Categories were followed by subthemes that exist within. The focus of the analysis and coding was on the emergent themes derived from the theoretically based discussion guide (see Table 2). Following coding, data were also organized according to the relationship and expectation domain of the PEN-3 and the HBM theoretical models to facilitate comparison with other articles in the literature (see Appendix A). This process follows similar procedures and is grounded in similar theoretical underpinnings as other qualitative studies conducted in preparation for intervention development among cancer survivors (Scarinci, Bandura, Hidalgo, & Cherrington, 2012). This approach further allowed for developing practical summaries of barriers and facilitators of activity among the population and will be used to inform the development of the physical activity survivorship intervention. Below is a concise summary of the findings, with detailed findings in Appendix A.

Table 2
Emergent themes and select quotes from focus groups and interviews regarding physical activity among Navajo cancer survivors

Summary Statement by Theme	Representative Quotes
Physical Activity and Cancer Perspectives	
PA provides balance in life and is a necessity for tending the home and animals on the reservation. PA can be protective against cancer, but cancer diagnosis was not attributed to insufficient PA due to adequate PA prior to diagnosis.	• "That's what our ancestors did, always move. You know move up until it gets dark and they go to sleep and next morning they do the same thing. They take the sheep out. It's good exercise, you know. And it makes your mind think." • "You can go to a weight room or else you can just go home and work, there is always plenty of work around your homestead, even though it may be hot outside just work with wiping the sweat away. Towards evening a person will be so tired it's just like going to the gym. It's the same." • "I am just happy I got my health back. Yeah, that's one thing I do not have to worry about, I go and enjoy bike ride; walking stuff like that" • "Where I grew up I use to be in sports, I grew up in sports. I took a lot of right food. When I got out of High School I was with the [mentions department where person was employed] for 14 years and we did a lot of physical I mean you have to be so I was with veteran for three years. Still I got it [cancer]."
Barriers to Physical Activity	
Cancer treatment side effects, lack of understanding how to safely get back to PA and how much PA to do, lack of personal and community resources, and social isolation were reported barriers to physical activity.	• "Well, cancer kind of like brings your body down. Like it just makes your body like um, less strong than you were before." • "When I returned from treatment, I had no strength. I can't even lift anything." • "Me, my grandchild says lets go grandma you are not that weak, come on lets go, he loves to hike I am not at his pace he is only six I cannot go hiking on the big old mountain around our house you know, but like sadly there is a lot of limitation but I tried to do some yoga but it's so hard your muscle is cramping, it's just really hard if somebody could tell what my limits were maybe you know get me on a routine or schedule maybe then I can do it, because sometimes I overdo it."
Motivators for Physical Activity	
Familial and social support, desire to support younger generations, self-motivation, restoring balance, honoring Navajo resilience, reducing burden to others, not showing weakness, Navajo traditions such as, rising before the sun to run or walk, were reported PA motivators.	• "Positive thinking, like he is saying, you have to think positively about yourself with prayers and tell yourself you can beat it." • "I have a sister that I sometimes stay with in Flagstaff. As much as I don't want to get off this couch, she's like, 'come on lets go even if you just walk a few steps or let's go to town, let's just go drive around you know and it makes a world of a difference so it does, there is an impact on you, you have to have that support."

continued on next page

Table 2 Continued
Emergent themes and select quotes from focus groups and interviews regarding physical activity among Navajo cancer survivors

Summary Statement by Theme	Representative Quotes
Motivators for Physical Activity cont.	
	• "It's got to be up to you, when I returned from treatment, I had no strength I can't even lift anything. Furthermore, 'I'm doing it for my kids' is what I thought to myself, and I started walking. Although I did not have the strength and courage, I did it. I have to get my strength back so I take my daughter with me, my youngest one, you have to take care of me and walk around with her." • "I have my daughter as my mentor who comes over. She tells me to 'do your exercise, mom.'" • "When I wake up the first thing in the morning at five o'clock and I ah that's when I ah that the day is young, the air is fresh, and I can concentrate on just running or walking down the road or the trail and I can see and hear the birds singing. I feel better just like your body is just ready, you are not heavy like ah in the middle of day or the end of the day when you go through the full day then you are tired. But when I get up in the morning I feel fresh."
Preferences for Physical Activity	
Preferences for delivery and type of PA varied. Group-based PA preferences were supported by social support, peer accountability, and shared experiences with fellow cancer survivors. Perspective of cancer as contagious created a barrier to group programs for some. Individual-based PA program preferences were related to social discomfort and accessibility. Walking, hiking, and being outside most preferred. Tending to animals, land, and the home valued and necessary. Many traditional activities are PA and support cultural identity, emotional balance, and harmony with nature. Limited access to PA programs, infrequent and inconsistent programming makes consistent PA difficult. Sustainability, incentives, and trained lay or community staff that also participated in PA was desired.	• "I like to be active with others that have the same disease that I have, maybe like some of them cancer survivor." • "I think for me it's just walking. A lot of it's just walking. You know, that's how we grow up too, starting with herding sheep." • "I don't, I don't see any cancer awareness or group therapy or anything like that. You know. I haven't been to a group at all." • "So maybe for people that don't have access to positive interaction with other people, there needs to be a group that goes around and says hey we're here! Come on, get on that bike let's go to the rodeo! Show some spirit!" • "You know I see people around which I'm so happy, they can ride horses, they can run. Just to keep them active you know, not being a couch potato." • "Just make sure your heart beat is really high for at least a good 15 to 30 minutes for your blood flow, that's what she [doctor] told me." • "Walking is what I prefer, aerobics too, [and] weightlifting. It depends on where you are at if you have the strength." • "They used to have a [Chapter name]. They used to have a physical uh therapy down there um with the machine in the community center. I don't know that happened. I haven't heard anything about it. There used to be a lot of people that used to go, but I never tried to go. I stopped by the chapter but I never asked about it."

Perspectives of Physical Activity and Cancer

While participants were aware that adequate amounts of PA and a balanced diet could serve as protective factors for cancer reoccurrence, many participants did not attribute their cancer diagnosis to insufficient PA or the lack of a balanced diet. Prior to diagnosis many participants reported participating in adequate amounts of PA.

Motivators for Physical Activity

Social support from cancer survivor peers and/or family members was often cited as a facilitator for PA. A desire to be there for family played a central role in motivating survivors to engage in PA. Positive perspectives about PA were often centered on self-motivation, finding balance, and getting back to a place of harmony with oneself and one's surroundings. Being physically active was seen as a form of resilience and a tool for maintaining strength following illness. While some participants mentioned that they became less physically active post-diagnosis and during treatment, they perceived a return to their active lifestyles as a form of a physical and emotional resurgence post-treatment. Others were motivated by a feeling of pride and minimizing burden to others, electing to actively tend to their chores and maintain an active lifestyle so as not show weakness. However, though participants had these reasons for returning to activity and desire to do so, they were often limited by symptoms, not knowing what and how much to do safely or when it was okay to return to normal levels of activity. Navajo traditions, such as walking, running, dancing, and sheep herding, were proffered as a driving factor and motivator to increase PA as well. Survivors noted a desire to be able to share cultural traditions, such as rising before the sun to run or walk, especially with children or grandchildren.

Barriers to Physical Activity

Many participants cited diagnosis and treatment side effects as the primary deterrent to PA. Participants also indicated that PA is often not the highest priority when concerned about survival. Additionally, gaps in communication between health care providers resulted in conflicting information about treatment and PA, which then resulted in diminished PA. Cancer survivors reported being afraid of "over doing it" and that family members and friends often encouraged rest for recovery without adequate knowledge of balancing rest with activity. Those that had physically demanding vocations voiced concern over returning to work. Other concerns included knowing when to return, when to limit activity, and how to balance livelihood with symptoms. Finally, participants cited lack of access to dedicated PA programs and/or safe spaces for activity as barriers to structured PA. This limitation was due primarily to rurality.

Preferences for Delivery, Type, and Desired Elements of Existing PA Programs

Although preferences for individual- versus group-based PA programs were inconsistent, many participants cited the positive impact of social and familial support, peer accountability, and shared experiences with fellow survivors as justifications for group programs. However, the perception of cancer as contagious and spread either physically or spiritually prohibited contact with family and friends for some survivors. Preferences for individual-based programs were often rooted in feeling uncomfortable participating in PA with people who do not share similar limitations with cancer survivors. Some participants expressed preference for survivor-only group programs so that they could participate in PA in a safe space with their peers.

While community-based activities like Zumba were casually mentioned, walking, hiking, and being outside whenever possible were emphasized as culturally valued and preferred types of activities. Participants also expressed a preference for outdoor activities like tending to the homestead, including caring for animals, tending to land, chopping wood, and hauling water, and exclaimed the need for a resurgence of these activities, particularly among the youth. Traditional activities were see as mutually beneficial considering that they could serve as PA while fostering cultural identity, emotional balance, and harmony with the surroundings.

While participants were aware of past and currently ongoing PA programs in the community, they noted that programs are often held in locations that hinder access to all interested community members and that programs are commonly a “one-day affair” that do not promote sustainability. Participants expressed that they have to find ways to motivate themselves because programs are sparse and often not held in spaces where they are most needed. Trainers and lay leaders that would participate in activity alongside the community members in training (i.e., walk the talk) were valued. Participants shared that when people feel personally invited they are more likely to attend activities because of the concept of shared accountability. Incentivizing with food or other gifts was mentioned as a viable approach to encourage survivors and their families to participate in PA programs.

DISCUSSION

This is the first study to evaluate the PA habits, barriers, and preferences of Navajo cancer survivors. The value of PA in the Navajo culture was evident, as was the value of resilience, which may serve as a natural motivator for PA among the Navajo during and following a serious illness (Teufel-Shone, Tippens, McCrary, Ehiri, & Sanderson, 2016). In addition, while habits and preferences varied by individual, some of the variation appeared to be driven by current circumstances and the availability of resources. Participants were clearly willing to engage in PA given the appropriate guidance and resources.

Variation across individual survivors in terms of habits and preferences is common in other communities as well (Stevinson et al., 2009; Van Duyn et al., 2007). Differences in preferences may be effectively addressed by offering both individual support for PA, as well as opportunities and infrastructure to support group-based programs. Effective strategies to support a group-focused approach for obesity treatment and prevention among AI/AN communities have been previously summarized and are in keeping with many of the perspectives shared by Navajo cancer survivors herein: “1) build and reinforce social cohesion and collective efficacy, 2) use the motivating force of friendly competition, and 3) aspire to change local norms and policies by a) assuring high visibility of alternate behaviors, and b) engaging formal and informal leaders” (Teufel-Shone, 2006, p. 224).

Barriers to PA were consistent and included cancer- and cancer treatment-related symptoms, fatigue, lack of time, lack of guidance regarding cancer survivor PA parameters, fear of doing too much, and lack of access to PA programs and safe spaces. Researchers also identified fear of spreading cancer, either physically or spiritually via discussing it, as a barrier to group-based activity that would include family, friends, and others that had not had cancer.

Fortunately, the benefits of exercise in other cancer survivor communities to reduce symptoms, fatigue, and improve quality of life are clear, and exercise among cancer survivors is safe during and after treatment (Schmitz et al., 2010). The ACSM roundtable on exercise guidelines for cancer survivors (Schmitz et al., 2010) has clearly stated that cancer survivors should follow the 2008 Physical Activity Guidelines for Americans (Physical Activity Guidelines Advisory Committee, 2008). Avoidance of inactivity, even in cancer patients with existing diseases or undergoing difficult treatments, may also be advisable (Schmitz et al., 2010). These guidelines can be used in educational efforts promoting exercise as medicine. With respect to cancer as a contagion, the concept has been recognized in American Indian, as well as other communities (Collie & Kante, 2011; Dein, 2004) Continued education regarding the pathobiology of cancer may help to dispel the notion of cancer as a contagion (Collie & Kante, 2011; Dein, 2004) and can be included in cancer exercise PA programs and other community programs. Lastly, PA guidance for various types of cancer has been published, including frequency, intensity, and duration of activity; adaptations based on disease and treatment-related adverse effects; and signs and symptoms indicating when to stop activity and seek medical care (Schmitz et al., 2010). The latter may be particularly important for those that have physically demanding jobs and are unsure when to return to work or reduce effort. This important information can be disseminated to clinicians, the community, and through targeted cancer survivor PA programs.

Importantly, other chronic disease prevention and management programs that include PA, such as the well-known Diabetes Prevention Program, are well accepted and have been successfully translated into diverse communities, including tribal communities (Hall, Lattie, McCalla, & Saab, 2016; Teufel-Shone, 2006), including for the Navajo Nation (program may be found at: http://www.nnsdp.org/). Therefore, it is reasonable to hypothesize that cancer survivor PA programs, informed by the HBM and PEN-3 guided research herein, can be similarly translated into the Navajo cancer survivor community and will be beneficial. Either creating specific cancer survivorship lifestyle programs or expanding the scope of practice of those leading diabetes prevention programs to cancer exercise is feasible as the main principles of exercise prescription and testing apply and training for specific clinical issues related to cancer can be easily added. Such an approach would enhance tribal capacity and has the potential to leverage resources, though funding challenges may need to be overcome if resources supporting diabetes prevention personnel are specific to diabetes grant sources. Nevertheless, whether in conjunction with or independent of diabetes prevention programs, effective tribal PA interventions for cancer survivors should include locally trained personnel, local leadership, stable funding, and culturally acceptable evaluation methods to assess health and social impact (Teufel-Shone, Fitzgerald, Teufel-Shone, & Gamber, 2009). The results presented herein, as well as the prior work in other chronic conditions, may be used to collaborate with the Navajo community to test the feasibility and effectiveness of a flexible, community-based PA intervention for Navajo cancer survivors that is both clinically and culturally appropriate.

This is the first qualitative inquiry of physical activity among Navajo cancer survivors. Consequently, the information presented will be valuable to PA and survivorship program planning efforts with the Navajo community. Successful recruitment of this sample indicates a community interest to dialogue about topics that are commonly regarded as taboo, suggesting a contemporary change in discourse about cancer in the community which could make interventions targeting cancer more feasible. This work also strengthens the relationships between the Navajo community and the health research community to collectively improve efforts aimed at preventing cancer and increasing the quality of life among cancer survivors.

While relatively small in the context of the nation, the sample size of this study was quite large when considering that eligible participants needed to be of Navajo decent and have a past cancer diagnosis. The adequacy of the sample size was determined by data saturation; focus groups and interviews were added until there was a diminishing variation in the transcribed and subsequently coded data. Due to the nature of focus groups, not all participants shared information on each topic. More detail is needed regarding current PA behaviors, including consistent frequency, intensity, and duration. The location of the interviews and focus groups was designed to be convenient for participants, but did not necessarily correspond to residential location. Therefore, a brief demographic and PA questionnaire should be included in future studies. Self-selection into a focus group versus an interview was allowed to accommodate personal and cultural inclinations. While a potential limitation, the choice of interaction type with study staff enhanced recruitment as participants were given the liberty of selecting a format in which they would be most comfortable to share their cancer experiences, which could have potentially increased the richness of the dialogue.

CONCLUSION

This study took the first step in understanding PA among Navajo cancer survivors. Cancer PA programs can be tailored to the Navajo community by utilizing this information in conjunction with the evidence-based cancer exercise guidelines (Schmitz et al., 2010). Disseminating the ideas that exercise is indeed medicine, honors cultural tradition, and draws upon Navajo resilience may serve as important motivators for PA before, during, and after cancer treatment.

REFERENCES

Airhihenbuwa, C. (1995). *Health and culture: Beyond the western paradigm*. Thousand Oaks, CA: Sage.

Barrera, M., Jr., Berkel, C., & Castro, F. G. (2016). Directions for the advancement of culturally adapted preventive interventions: Local adaptations, engagement, and sustainability. *Prevention Science*, *18*(6), 640-648. http://dx.doi.org/10.1007/s11121-016-0705-9

Centers for Disease Control and Prevention. (2016). *Cancer among American Indians and Alaska Natives*. Retrieved from https://www.cdc.gov/cancer/healthdisparities/what_cdc_is_doing/aian.htm

Collie, K., & Kante, A. (2011). Art groups for marginalized women with breast cancer. *Qualitative Health Research*, *21*(5), 652-661. http://dx.doi.org/10.1177/1049732310383989

Dein, S. (2004). Explanatory models of and attitudes towards cancer in different cultures. *Lancet Oncology*, *5*(2), 119-124. http://dx.doi.org/10.1016/S1470-2045(04)01386-5

Foley, D, Kinlacheeny, JB , & Yazzie, D. (2016). *Navajo Nation mortality report, 2006-2009. Arizona & New Mexico data*. Window Rock, AZ: Navajo Epidemiology Center.

Hall, D. L., Lattie, E. G., McCalla, J. R., & Saab, P. G. (2016). Translation of the diabetes prevention program to ethnic communities in the United States. *Journal of Immigrant and Minority Health*, *18*(2), 479-489. http://dx.doi.org/10.1007/s10903-015-0209-x

Hardy, Hulen, Saul, Hughes, Shaw, Pinn, . . . Begay. (In review). Locating wellness at home: Health and healthcare among American Indians in Arizona.

Irwin, M. L., McTiernan, A., Manson, J. E., Thomson, C. A., Sternfeld, B., Stefanick, M. L., . . . Chlebowski, R. (2011). Physical activity and survival in postmenopausal women with breast cancer: Results from the women's health initiative. *Cancer Prevention Research*, *4*(4), 522-529. http://dx.doi.org/10.1158/1940-6207.CAPR-10-0295

Irwin, M. L., Smith, A. W., McTiernan, A., Ballard-Barbash, R., Cronin, K., Gilliland, F. D., . . . Bernstein, L. (2008). Influence of pre- and postdiagnosis physical activity on mortality in breast cancer survivors: The health, eating, activity, and lifestyle study. *Journal of Clinical Oncology*, *26*(24), 3958-3964. http://dx.doi.org/10.1200/JCO.2007.15.9822

Iwelunmor, J., Newsome, V., & Airhihenbuwa, C. O. (2014). Framing the impact of culture on health: A systematic review of the PEN-3 cultural model and its application in public health research and interventions. *Ethnicity and Health*, *19*(1), 20-46. http://dx.doi.org/10.1080/13557858.2013.857768

Meyerhardt, J. A., Heseltine, D., Niedzwiecki, D., Hollis, D., Saltz, L. B., Mayer, R. J., . . . Fuchs, C. S. (2006). Impact of physical activity on cancer recurrence and survival in patients with stage III colon cancer: Findings from CALGB 89803. *Journal of Clinical Oncology*, *24*(22), 3535-3541. http://dx.doi.org/10.1200/JCO.2006.06.0863

Navajo Epidemiology Center. (2006). *Cancer among the Navajo 1994-2004*. Retrieved from http://www.nec.navajo-nsn.gov/Portals/0/Reports/Navajo%20Cancer%20Rpt%20062610.pdf

Physical Activities Guidelines Advisory Committee. (2008). *Physical activity guidelines advisory committee report.* Washington DC: U.S. Department of Health and Human Services. Retrieved from https://health.gov/paguidelines/report/pdf/CommitteeReport.pdf

Rosenstock, I. M. (1974). Health Belief Model and preventive health behavior. *Health Education Monographs, 2*(4), 354-386. http://dx.doi.org/10.1177/109019817400200405

Scarinci, I. C., Bandura, L., Hidalgo, B., & Cherrington, A. (2012). Development of a theory-based (PEN-3 and Health Belief Model), culturally relevant intervention on cervical cancer prevention among latina immigrants using intervention mapping. *Health Promotion Practice, 13*(1), 29-40. http://dx.doi.org/10.1177/1524839910366416

Schmitz, K. H., Courneya, K. S., Matthews, C., Demark-Wahnefried, W., Galvao, D. A., Pinto, B. M., . . . American College of Sports, Medicine. (2010). American college of sports medicine roundtable on exercise guidelines for cancer survivors. *Medicine and Science in Sports and Exercise, 42*(7), 1409-1426. http://dx.doi.org/10.1249/MSS.0b013e3181e0c112

Siegel, R., Ma, J., Zou, Z., & Jemal, A. (2014). Cancer statistics, 2014. *CA: A Cancer Journal for Clinicians, 64*(1), 9-29. http://dx.doi.org/10.3322/caac.21208

Stevinson, C., Capstick, V., Schepansky, A., Tonkin, K., Vallance, J. K., Ladha, A. B., . . . Courneya, K. S. (2009). Physical activity preferences of ovarian cancer survivors. *Psycho-Oncology*, *18*(4), 422-428. http://dx.doi.org/10.1002/pon.1396

Teufel-Shone, N. I. (2006). Promising strategies for obesity prevention and treatment within American Indian communities. *Journal of Transcultural Nursing, 17*(3), 224-229. http://dx.doi.org/10.1177/1043659606288378

Teufel-Shone, N. I., Fitzgerald, C., Teufel-Shone, L., & Gamber, M. (2009). Systematic review of physical activity interventions implemented with American Indian and Alaska Native populations in the United States and Canada. *American Journal of Health Promotion, 23*(6), S8-32. http://dx.doi.org/10.4278/ajhp.07053151

Teufel-Shone, N. I., Tippens, J. A., McCrary, H. C., Ehiri, J. E., & Sanderson, P. R. (2016). Resilience in American Indian and Alaska Native public health: An underexplored framework. *American Journal of Health Promotion*. (E-pub ahead of print)1-8. http://dx.doi.org/10.1177/0890117116664708

U.S. Census Bureau. (2010). *2010 census. American Indian and Alaska Native summary file. Dp-1 - profile of general population and housing characteristics: 2010.*

Van Duyn, M. A., McCrae, T., Wingrove, B. K., Henderson, K. M., Boyd, J. K., Kagawa-Singer, M., . . . Maibach, E. W. (2007). Adapting evidence-based strategies to increase physical activity among African Americans, Hispanics, Hmong, and Native Hawaiians: A social marketing approach. *Preventing Chronic Disease, 4*(4), A102. Retrieved from https://www.cdc.gov/pcd/issues/2007/oct/07_0025.htm

White, M. C., Espey, D. K., Swan, J., Wiggins, C. L., Eheman, C., & Kaur, J. S. (2014). Disparities in cancer mortality and incidence among American Indians and Alaska Natives in the United States. *American Journal of Public Health, 104(Suppl 3)*, S377-387. http://dx.doi.org/10.2105/AJPH.2013.301673

World Cancer Research Fund/ American Institute for Cancer Research. (2007). *Food, nutrition, physical activity, and the prevention of cancer: A global perspective*. Washington DC: AICR. Retrieved from http://www.aicr.org/assets/docs/pdf/reports/Second_Expert_Report.pdf

FUNDING INFORMATION AND ACKNOWLEDGEMENTS

We would like to thank the Navajo Nation Historic Preservation Department, Navajo Nation Human Research Review Board (NNHRRB), the Chapter House, Arizona Oncology Associates, and all the participants for their support of this project. Funding was provided by: National Cancer Institute U54CA143924, U54CA143925 & P30CA023074; University of Arizona Faculty Seed Grant; University of Arizona Undergraduate Biology Research Program HHMI 52006942; and Northern Arizona University BRIDGES to Baccalaureate NIGMS1R25GM102788-01.

AUTHOR INFORMATION

Dr. Bea is an Assistant Professor of Medicine and Assistant Research Scientist for Nutritional Sciences at the University of Arizona Cancer Center and University of Arizona Collaboratory for Metabolic Disease Prevention and Treatment in Tucson, AZ.

Dr. Hendrik 'Dirk' de Heer is an associate professor in the Department of Health Sciences at Northern Arizona University at Northern Arizona University in Flagstaff, AZ.

Dr. Luis Valdez works for Health Promotion Services in the Mel & Enid Zuckerman College of Public Health at the University of Arizona in Tucson, AZ.

Brian Kinslow is a Doctor of Physical Therapy and is practicing at Evolve Flagstaff in Flagstaff, AZ.

Etta Yazzie is part of the University of Arizona Cancer Center in Tucson, AZ and part of Arizona Oncology Associates in Flagstaff, AZ.

Mark C. Lee is part of the Department of Nutritional Sciences at the University of Arizona and is part of the University of Arizona Cancer Center in Tucson, AZ.

Peal Nez is part of the College of Health and Human Services at Northern Arizona University in Flagstaff, AZ.

Shelby Dalgai is part of the Department of Biological Sciences in the College of Health and Human Services at Northern Arizona University in Flagstaff, AZ

Dr. Anna L. Schwartz is a professor in the School of Nursing in the College of Health and Human Services at Northern Arizona University in Flagstaff, AZ.

Appendix A
Qualitative findings organized according to the PEN-3 and HBM Models

PEN-3 Model	Qualitative Findings
Perceptions of Physical Activity	*Positive* • PA is an imperative part of a healthy lifestyle • PA is associated with self-motivation, seeking balance, and returning to a place of harmony with themselves and their surroundings • PA can facilitate cancer and other disease treatment adherence • PA is seen as a way to overcome disease and the accompanying symptoms • Many traditional daily activities like tending to animals, land, and family responsibilities allow people to participate in PA *Negative* • While participants were aware that a healthy lifestyle could serve as a protective factor for cancer reoccurrence, many participants did not attribute their cancer diagnosis to the lack of sufficient PA or a balanced diet. On the contrary, participants often mentioned that prior to diagnosis they were participating in adequate amounts of PA and that the diagnosis and treatment process (symptoms, fatigue, lack of time, etc.) has been the primary deterrent of PA • Participants are often afraid of "overdoing it" • Beliefs that they are unable to bounce back / return to prior level of function • PA recommendations for survivors (when to do what) largely unknown
Physical Activity Enablers	*Positive* • Participants are aware of past and current PA programs in both urban and rural settings • Incentivizing with food or other gifts was identified as viable approach to have people and their families participate • Perceived shared accountability created when people feel personally invited to PA programs and related activities increases likelihood of individual and family attendance • Adequate access to available fitness centers was cited as a motivator for structured PA • Trust in some community organizations (chapter house, school) • Participant's lifestyles require them to complete significant amounts of physical activity (housework, tending to land/livestock) *Negative* • Limited financial means • Limited services available in close proximity (depending on location) • Logistic challenges during treatment (travel, housing during extended treatments, livestock/ agriculture responsibilities during treatment, etc.) • Lack of community programs for cancer survivors
Physical Activity Nurturers	*Positive* • Participants are often encouraged by their family and friends to participate in physical activity • The social support from cancer survivor peers and/or family members were often cited as facilitators to PA • Family plays a central role in motivating survivors to get up and moving • Seeking balance is seen as one of the primary motivators for PA • Being adequately informed about existing PA programs promotes attendance • Cultural alignment with aerobic PA (run towards the sun, running in ceremonies) • Environmental need for physical activity (farming, housework) • Cultural emphasis on restoring balance in life *Negative* • Cultural taboo on discussing cancer (even with family members) • Cultural gender roles can discourage females from participating in PA • Cultural prevalence of alcohol, drugs, and other unhealthy behaviors • Lack of others participating in regular, organized PA • Family members often unaware of PA recommendations for survivors and tell survivors to remain sedentary

continued on next page

Appendix A Continued
Qualitative findings organized according to the PEN-3 and HBM Models

Health Belief Model	Qualitative Findings
Perceived Susceptibility	• While participants were aware that a healthy lifestyle could serve as a protective factor for cancer reoccurrence, many participants did not attribute their cancer diagnosis to the lack of sufficient PA or a balanced diet. On the contrary, participants often mentioned that prior to diagnosis they were participating in adequate amounts of PA and that the diagnosis and treatment process (symptoms, fatigue, lack of time, etc.) has been the primary deterrent of PA • Correct identification of behavioral lifestyle choices as a risk factor, i.e. diet and PA, for cancer • Incorrect identification of risk factors among family/community members (contagious) • Fatalism (risk factors beyond person's control) • Preventive care is a lower priority when concerned with survival
Perceived Severity	• There have been many changes in the Navajo community that have diminished the amount of PA that people get • Sentiments shared by older participants were PA in the community diminishes with each generation; participants cite the availability of processed foods and convenient food outlets with diminishing traditional food cultivation methods, which decreases quality of food consumed and PA
Perceived Barriers	• PA is often not a priority when cancer survivors are worried simply about survival • Inefficient communication between healthcare providers results in conflicting information about treatment and PA • Lack of access to dedicated PA programs and/or safe spaces for activity, due primarily to rurality, are common barriers • Patient-provider gaps in communication cause participant confusion about PA activity norms and expectations • Current PA programs are few and far between. They are often one-day events that participants perceive to be unsustainable • Current PA programs are commonly held in centralized/urbanized locations that maybe be difficult for the community in need to access; those that live in rural areas are particularly affected • While participants were aware of past and currently active PA programs, they claimed that programs are often held in locations that hinder access to all interested community members and that programs are commonly a "one-day affair" that do not promote sustainability. Participants express that they have to find ways to motivate themselves because programs are sparse and often not held in spaces where they need them • Treatment side effects (fatigue, muscle weakness, persistent pain)
Perceived Benefits	• Positive perspectives about physical activity are often centered around self-motivation, finding balance and getting back to a place of harmony with oneself and one's surroundings • There is a perceived need to participate in PA to overcome the disease and the implied symptoms • Being able to perform even the smallest amount of PA is seen as a way of staying motivated to adhere to treatment to try to get back to a place of balance • Having adequate access to available fitness centers was cited as a motivator for structured PA • Some participants exclaim that sufficient PA as part of a healthful lifestyle can prevent cancer reoccurrence • Understand benefits of physical activity and healthy, traditional diet • Emphasize personal responsibility and perseverance • Desire to be healthy and support family

continued on next page

Appendix A Continued
Qualitative findings organized according to the PEN-3 and HBM Models

Health Belief Model	Qualitative Findings
Self-Efficacy (HBM)	• There was a consensus that participants would be willing to participate in PA programs • Participants often expressed that they are self-motivated to participate in PA, even without the presence of a structure program • The participant's expressed need to find balance and harmony keeps them motivated to adhere to healthful behaviors • Sense of personal responsibility to get back to function • Participant's cancer diagnosis and treatment process is their first experience with physical limitations that are often discouraging of any PA • Fatalism • Lack of knowledge about appropriate PA during and after treatment • Persistent treatment side effects and other conditions not related to cancer (low back pain, diabetes, etc.)

HBM = Health Behavior Model; PA = physical activity

SCREENING FOR POSTPARTUM DEPRESSION IN AMERICAN INDIAN/ALASKA NATIVE WOMEN: A COMPARISON OF TWO INSTRUMENTS

Jennifer L. Heck, MS, RNC-NIC, CNE

Abstract: This review examined validation studies of the Edinburgh Postnatal Depression Scale (EPDS) and the Patient Health Questionnaire-9 (PHQ-9) to identify an appropriate postpartum depression (PPD) screening tool for American Indian and Alaska Native (AI/AN) women in the U.S. Databases were searched using: EPDS paired with psychometric properties or validation and PHQ-9 paired with PPD and psychometric properties or validation, yielding a final sample of 58 articles. Both tools have good internal consistency, but discriminative validity for detecting PPD in women from non-Western cultures is low. Positive predictive values in these women are low and diverse (EPDS [n = 21] median 67%, range 21.1-90%; PHQ-9 [n = 1] median 26%). The low predictive accuracy of both tools suggests the tools may be culturally biased.

INTRODUCTION

Women often report delight after giving birth (Bina, 2008), but when they develop postpartum depression (PPD), it is far from delightful. For postpartum women with depressive symptoms and their health care providers, it is important to differentiate postpartum depressive symptoms from other symptoms that occur in the postpartum period that are normative of childbirth. Pregnancy induces changes in many body functions, so the majority of changes, or symptoms, that postpartum women experience are the body's way of reverting to a normal, non-pregnant state. These symptoms typically last for six weeks following delivery, although some can last longer. For example, alterations in sleep can occur for months after delivery (Blackburn, 2013), and poor sleep quality is a risk factor for PPD (Okun, 2015; Okun et al., 2011; Wu et al., 2014). Further, sleep deprivation is associated with higher levels of pro-inflammatory cytokines, which is important because higher plasma concentrations of pro-inflammatory cytokines are associated with PPD (Chang, Pien, Duntley, & Macones, 2010). Changes in sleeping patterns are a common finding for many postpartum women (Committee on Obstetric Practice, 2015), and it is difficult to discern if a woman's alteration in sleep is a symptom of her postpartum period (e.g., becoming a new mother) or if it is a symptom of postpartum depression. These issues complicate assessing postpartum depressive symptoms; therefore, it is important to have reliable and valid PPD screening instruments.

Through a pilot study (Heck, 2015) conducted in conjunction with the Department of Health and the Department of Family Services of the Chickasaw Nation, a tribal nation that operates its own tribal health system and delivers health care to its members and other AI/AN people (The Chickasaw Nation, n.d.), it was discovered that health care providers in facilities throughout the Chickasaw Nation health system use the PHQ-9 (Kroenke, Spitzer, & Williams, 2001) to screen AI/AN women for PPD. The PHQ-9 is a general screen for depressive disorders and has items that may coincide with normal symptoms of the postpartum period, such as fatigue and sleeping difficulties. Other tools, such as the EPDS (Cox, Holden, & Sagovsky, 1987), have been widely used to screen for PPD specifically, placing less emphasis on somatic symptoms of depression that are relatively common and normal findings in the postpartum period.

Despite PPD's worldwide manifestation, there is a disparity in the PPD literature. Currently in the U.S., the majority of PPD research focuses on middle class, Caucasian women, highlighting a gap in the literature investigating PPD from a culturally diverse perspective. Other minority women, particularly AI/AN women, are largely underrepresented. Few studies report on PPD in these women, demonstrating a basic lack of understanding of PPD in this population. For instance, in the U.S. five studies report PPD prevalence in American Indian women, which ranges from 18.17 to 29.3 percent (Baker et al., 2005; Ertel, Rich-Edwards, & Koenen, 2011; Oklahoma State Department of Health, 2008; Segre, Losch, & O'Hara, 2006; Wei et al., 2008). This is much higher than the 10 to 15 percent prevalence reported for the general U.S. population of women (Gaynes et al., 2005) and suggests a racial/ethnic disparity in PPD.

Evidence supports that screening for and early detection of PPD improves treatment and outcomes (Hanna, Jarman, Savage, & Layton, 2004; O'Connor, Rossom, Henninger, Groom, & Burda, 2016; Siu & U.S. Preventive Services Task Force, 2016) and contributes to its status as a national public health priority. However, the current lack of knowledge about the effectiveness of standard treatment and issues with detection in AI/AN women could be masking an even greater prevalence and incidence than what is currently reported. Therefore, the purpose of this integrative review was to examine the validation studies of the EPDS and the PHQ-9 to identify an appropriate PPD screening instrument for use with AI/AN women. Specific aims were to: 1) systematically examine and analyze the psychometric properties of the PHQ-9 when screening for PPD in a variety of samples of ethnic minority women and women from non-Western cultures; 2) systematically examine and analyze the psychometric properties of the EPDS in similar samples; and 3) compare and contrast the psychometric properties of the PHQ-9 to those of the EPDS when screening for PPD in culturally diverse samples of women, and specifically AI/AN women.

Background and Significance

Postpartum depression affects about one in seven new mothers in the U.S. (O'Hara & McCabe, 2013). While there is some disagreement as to when it begins or how long it persists, PPD is clinically defined as a major depressive episode that occurs any time up to one year following childbirth (American Psychiatric Association [APA], 2013; O'Hara & McCabe, 2013). Its adverse maternal, infant/child, and family effects (Horwitz, Briggs-Gowan, Storfer-Isser, & Carter, 2007; Miklush & Connelly, 2013) increase use of health care resources, which indirectly impacts global society (Agency for Healthcare Research and Quality, 2013). This chain of influence is linked to maternal symptoms of guilt and despair, depressed mood, and fatigue (APA, 2013; O'Hara & McCabe, 2013). As one might expect, these symptoms negatively influence the mother-infant relationship, causing insecure attachment (Hennighausen & Lyons-Ruth, 2007). Attachment disorders can lead to aggression in the child during school-aged years (Hennighausen & Lyons-Ruth, 2007; Klaus & Kennell, 1976) and psychopathology in late adolescence (Hennighausen & Lyons-Ruth, 2007) that ultimately leads to more financial and social demands on the societal whole.

Screening for Postpartum Depression

The U.S. Department of Health and Human Services' (USDHHS) *Healthy People 2020* initiative for health promotion and disease prevention has recently added an objective for reducing the rate of PPD symptoms in the U.S. (USDHHS, 2016). Additionally, in January 2016 the U. S. Preventive Services Task Force released an updated recommendation for depression screening in adults to include pregnant and postpartum women (Siu & U.S. Preventive Services Task Force, 2016). This is crucial, as screening for depression in postpartum women is associated with improved outcomes. More specifically, depression-screening programs for pregnant and postpartum women reduce the prevalence of depression, increase remission of depression symptoms, and increase treatment response (O'Connor et al., 2016; Siu & U.S. Preventive Services Task Force, 2016). Research suggests that early identification or detection is key in the treatment of PPD (Hanna et al., 2004), so there is clear benefit to screening for depression in postpartum women.

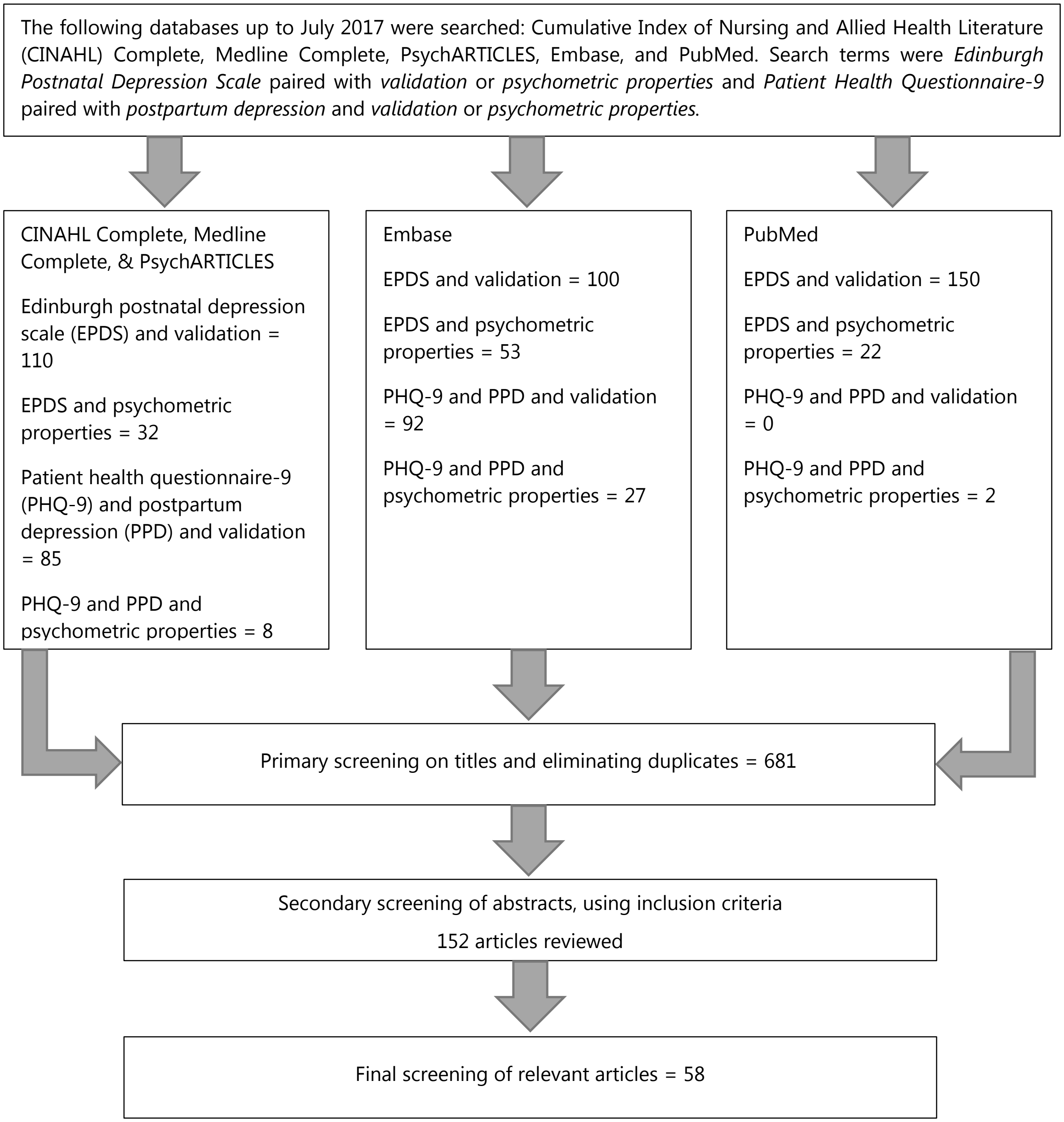
MATERIALS AND METHODS

This integrative review serves as a comparative instrument analysis examining validation studies of the EPDS and the PHQ-9 to identify an appropriate PPD screening instrument for AI/AN women in the U.S. By extension, strengths and weaknesses of the PPD literature surrounding screening are highlighted. This is a necessary step toward improving the PPD knowledge base (Torraco, 2005).

Search Strategy

The search strategy included Medline Complete, PsychARTICLES, Embase, PubMed, and Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete databases. Initial search terms were *Edinburgh Postnatal Depression Scale* paired with *psychometric properties* or *validation* and *Patient Health Questionnaire-9* paired with *postpartum depression* and *psychometric properties* or *validation*. Studies published in English and those that sampled ethnic minority or non-Western cultured adult women were included. Research studying women still or not yet pregnant was excluded. Additionally, research studying adolescent mothers was excluded, as there is evidence that the EPDS performs differently with adolescent versus adult mothers (Logsdon & Myers, 2010). There is a growing body of literature surrounding PPD in adolescent women, and this topic is beyond the scope and purpose of this review. Reference lists from retrieved studies provided additional citations that were recovered manually, yielding a final sample of 58 articles. See Figure 1 for a visual representation of the search strategy and decision-making based on inclusion/exclusion criteria.

Figure 1. Search Strategy for *Screening for Postpartum Depression in American Indian/Alaska Native Women: A Comparison of Two Instruments*



Data Evaluation and Analysis

The literature search produced 58 articles investigating PPD using either the EPDS or the PHQ-9 as the screening instrument in samples of culturally diverse women and represented several disciplines including nursing, psychology, medicine (mostly psychiatry), public health, social work, education, political science, pharmacy, and epidemiology (see Appendix Tables A1 and A2). All abstracts were read to identify relevant reports. Any studies deemed relevant (or if relevance was uncertain) were read in full, and studies were categorized according to the screening instrument used. The selected studies were evaluated in terms of level of evidence using the American Association of Critical-Care Nurses (AACN) system (see Table 1; Armola et al., 2009). Lastly, the psychometric performance of the EPDS and the PHQ-9 was critiqued for each study reviewed (see Tables 5-8).

Table 1
American Association of Critical-Care Nurse's Evidence-Leveling System (Armola et al., 2009)

Level	Evidence
A	Meta-analysis of multiple controlled studies or meta-synthesis of qualitative studies with results that consistently support a specific action, intervention or treatment
B	Well-designed controlled studies, both randomized and nonrandomized, with results that consistently support a specific action, intervention, or treatment
C	Qualitative studies, descriptive or correlational studies, integrative reviews, systematic reviews, or randomized controlled trials with inconsistent results
D	Peer-reviewed professional organizational standards, with clinical studies to support recommendations
E	Theory-based evidence from expert opinion or multiple case reports
M	Manufacturers' recommendations only

RESULTS

Findings are categorized according to format, reliability, concurrent validity, predictive validity, and predictive accuracy. Findings from studies using the PHQ-9 and the EPDS are compared and contrasted within each category.

Format

PHQ-9

The PHQ-9 was developed in 2001 and is intended to screen for a variety of depressive disorders, such as major depressive disorder, as defined by the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV; Kroenke et al., 2001). It is a nine-item, self-report scale that can be completed in less than five minutes (see Table 2; Kroenke et al., 2001). Unlike the EPDS, it does not exclude common somatic symptoms of the postpartum period, thereby lowering specificity when screening for PPD in women. Originally validated in a sample of 580 primary care (male and female) and OB-GYN (female) clinic patients in the U.S., the authors suggested a cut-off score of 10 (Kroenke et al., 2001). While only a few studies assess the psychometric properties of the PHQ-9 when screening specifically for PPD (*n* = 7), this instrument has been validated in other samples as a reliable and valid instrument for screening for other depressive disorders (Arroll et al., 2010; Martin, Rief, Klaiberg, & Braehler, 2005). It is now available in over 30 other languages, including Arabic (Sawaya, Atoui, Hamadeh, Zeinoun, & Hahas, 2016), Chinese (Yeung et al., 2008), and Korean (Shin et al., 2010).

EPDS

The EPDS was created in 1987 and has been used globally to screen for PPD (Cox et al., 1987). It is a ten-item, self-report scale that can be completed in less than five minutes (see Table 2; Cox et al., 1987). The EPDS was born from the need for a depression screening scale with fewer limitations when used with childbearing women. In particular, authors were interested in placing less emphasis on somatic symptoms of depression, such as sleep disturbances and fatigue, because they are relatively common and can be normal findings in the postpartum period. In reducing the emphasis on these somatic symptoms, the EPDS was the first instrument to screen specifically for PPD, thereby increasing specificity. It was originally validated in a sample of 84 postpartum women in an out-of-hospital setting in England; the authors suggested a cut-off score of 9/10 (Cox et al., 1987). It is now available in 23 other languages, including Greek (Leonardou et al., 2009), Hungarian (Töreki et al., 2014), and Sudanese (Khalifa, Glavin, Bjertness, & Lien, 2015) and has also been validated in samples of fathers (Loscalzo, Giannini, Contena, Gori, & Benvenuti, 2015) and adolescent mothers (Logsdon & Myers, 2010).

Table 2
Format Findings

	PHQ-9	**EPDS**
# Items	9	10
Range of Scores	0 – 27	0 – 30
Diagnostic Cut Point	10	9/10
Minutes to Complete	5	5
Reading Level	3rd grade	4th – 5th grade
Item Characteristics	DSM-IV criteria, no anxiety items for major depressive disorder	Differentiate symptoms from pregnancy/ postpartum; includes anxiety item for PPD

Reliability

Table 3 shows a summary of the reliability of the PHQ-9 and EPDS when screening for PPD from the studies reviewed (*n* = 58). While the reviewed studies included seven using the PHQ-9 and 54 using the EPDS, not all studies reported reliability values or statistics. For example, some reported internal consistency and no sensitivity, specificity, positive predictive value, or negative predictive value, while others reported all five values. Of the 58 studies reviewed, 37 reported some or all reliability information, with three using the PHQ-9 and 36 using the EPDS.

Internal consistency is one component of reliability and speaks to the extent to which the items on a scale are 1) interrelated and 2) all measuring the same attribute (Polit & Yang, 2016). Internal consistency is measured by computing Cronbach's alpha (α), and values of .70 and higher are desirable (Adams & Lawrence, 2015; DeVellis, 2017). In terms of screening for PPD, internal consistency values were above .70 for both tools and were, therefore, acceptable (see Table 3).

Another approach to establishing internal consistency is split-half reliability (Adams & Lawrence, 2015), which offers a method of determining test-retest reliability without administering the test twice (Grove, Burns, & Gray, 2013). Test-retest reliability speaks to the degree to which scores can be replicated with repeated administrations of the tool (Polit & Yang, 2016). There are no reports of split-half or test-retest reliability for the PHQ-9 when used to screen for PPD; however, in its original validation study, test-retest reliability was reported as "excellent," yet no value was given. For the EPDS, split-half reliability (Pearson's *r*) and test-retest reliability were acceptable (see Table 3). Based on biostatistician guidelines, Pearson's *r* values above .70 are generally acceptable (Adams & Lawrence, 2015), and ICC values above .60 are generally acceptable (Cicchetti, 1994).

Table 3
Reliability Findings

	Cronbach's alpha	**Split-Half (Pearson's *r*)**	**Split-Half (Guttman's coefficient)**	**Test-Retest**	**ICC**
PHQ-9 Median (Range)	.85 (.79 - .88) *n* = 3	Not Reported (NR)	NR	NR	.75 *n* = 1
EPDS Median (Range)	.83 (.47 - .90) *n* = 36	.855 (.83 - .88) *n* = 2	.74 *n* = 1	.82 (.74 - .9) *n* = 2	.714 (.51 - .918) *n* = 2

Concurrent Validity of the PHQ-9 to the EPDS

Concurrent validity is demonstrated when a test correlates well with an instrument that has previously been validated (Polit & Yang, 2016), and two studies report on this validity for the PHQ-9 and the EPDS in women (see Table 4). Both report acceptable correlations, but it is noteworthy that in the Hanusa, Scholle, Hakett, Spadaro, and Wisner (2008) study 72 percent of the sample was Caucasian. In addition, Flynn, Sexto, Ratliff, Porter, and Zivin (2011) used summary scoring for the acceptable Pearson's *r*. When PHQ-9 diagnostic scoring was used, the degree of agreement between the EPDS and the PHQ-9 (*k* >.7) was only 0.5 for postpartum women (Flynn et al., 2011). It appears that correct identification of the diagnostic group was reduced due to decreased sensitivity in using this method (diagnostic versus summary scoring). Yawn et al. (2009) reported 17 percent discordance between the EPDS and the PHQ-9. It seems as though the two screening tools, when screening for PPD, are categorizing differently.

Table 4
Concurrent Validity of the PHQ-9 to the EPDS

First Author (Year)	Sample	Correlation
Hanusa (2008)	123 women in the first six months postpartum	Pearson's *r* = .75
Flynn (2010)	104 postpartum women	Pearson's *r* = .769 Kappa = .54

Predictive Validity

Table 5 displays a summary of the predictive validity of the PHQ-9 and the EPDS when screening for PPD from the studies reviewed (*n* = 58). Again, not all studies reported validity values or statistics. Of the 58 studies reviewed, 49 reported some or all predictive validity values or statistics, with five using the PHQ-9 and 47 using the EPDS. Both instruments had comparable sensitivity in screening for PPD in the studies reviewed. As might be expected due to the inclusion of items related to somatic symptoms of depression, the PHQ-9 had reduced specificity when screening for PPD as compared to the EPDS.

Table 5
Predictive Validity

	PHQ-9 **Median (Range)** ***n*=5**	**EPDS** **Median (Range)** ***n*=47**
Sensitivity (%)	85.5 (80 – 94)	88.5 (62 – 100)
Specificity (%)	70 (31 – 84)	84 .5 (25.5 – 98.18)
Positive Predictive Value (%)	26 (N/A)	67.45 (21.1 – 90)
Negative Predictive Value (%)	98 (63 – 99)	97 (64 – 100)

Predictive Accuracy

The EPDS excludes common symptoms of the postpartum period such as fatigue, but discriminative validity for detecting PPD in samples of women drawn from non-Western cultures is low (see Table 6). Reported positive predictive values in non-Western samples range from 21.1 to 90 percent and negative predictive values range from 70 to 100 percent. However, 46.6 percent (*n* = 27) of the studies reviewed did not report a negative predictive value (eight from non-Western countries), and 29.3 percent (*n* = 17) did not report a positive predictive value (seven from non-Western countries). Also important to note is that 36.2 percent (*n* = 21) of these studies report a prevalence at or below reported U.S. prevalence estimates (10%-15%). Moving from the Felice, Saliba, Grech, and Cox (2006) study to the Teng et al. (2005) study, there appears to be a natural drop in positive predictive values (see Table 6). Finally, for the PHQ-9, discriminative validity for detecting PPD in culturally diverse samples of women is extremely limited, as only one study was found that reported psychometric properties of the EPDS in screening for PPD, and it was conducted outside the U.S. (see Table 6; Weobong et al., 2009).

Table 6
Predictive Accuracy

First Author (Year)	**Country (*n*)**	**PPV (%)**	**NPV (%)**	**Prevalence (%) T1, T2, etc.**
Mahmud (2003)	Malaysia (64)	90	100	14.1
Agoub (2005)	Morocco (144)	86	NR	18.7, 6.9, 11.8, 5.6
Husain (2014)	Pakistan (601)	82	70	NR
Pollock (2006)	Mongolia (94)	81.4	77.1	NR
Rowel (2008)	Sri Lanka (204)	80.6	91.8	NR
Bhusal (2016)	Nepal (346)	77	99.3	17.1
Uwakwe (2003)	Nigeria (225)	75	97	10.7
Chibanda (2009)	Zimbabwe (220)	74	94	33.0
Felice (2006)	Malta (239)	68.2	98.5	8
Teng (2005)	Taiwan (203)	46	99	10.3

continued on next page

Table 6
Predictive Accuracy

First Author (Year)	Country (*n*)	PPV (%)	NPV (%)	Prevalence (%) T1, T2, etc.
Lee (1998)	China (145)	44	97	12.0
Ghubash (1997)	UAE (95)	44	99	26.0
Tesfaye (2010)	Ethiopia (105)	42.9	93.8	NR
Regmi (2002)	Nepal (100)	42	100	5.0
Gausia (2007)	Bangladesh (100)	40	99	9.0
Bunevičius (2009)	Lithuania (94)	35	98	14
Khalifa (2015)	Sudan (238)	33	98	9.2
Aydin (2004)	Turkey (341)	30	95	35.8
Pitanupong (2007)	Thailand (351)	26	96	8.4
Weobong (2009) using PHQ-9	Ghana (160)	26	99	NR
Weobong (2009) using EPDS	Ghana (160)	22	97	Not Reported (NR)
Lawrie (1998)	South Africa (103)	21.1	100	24.5

DISCUSSION

Both the PHQ-9 and the EPDS are intended to screen for depression and are quick and easy to complete. Neither scale has been normed, but there have been recommended cut-off scores established for both (Cox et al., 1987; Kroenke et al., 2001). With the EPDS, more false positives are possible, with a greater likelihood to diagnosis women without PPD as having PPD. Clinically, this is good for screening, assuming the cost of workup and treatment outweighs the cost of starting women on the treatment regimen and labeling them with a disorder they do not have. In terms of research, this can be problematic for finding women that meet inclusion criteria.

While possessing excellent concurrent validity, the low predictive accuracy of both instruments in samples of culturally diverse women suggests a cultural bias, where perhaps the terms used in the scales are not meaningful and/or PPD is viewed, characterized, or manifested differently in these cultures of women. The low predictive accuracy could also be attributed to underreporting. The EPDS is far more validated for PPD screening than the PHQ-9, yet neither instrument has been cross-culturally adapted or validated for PPD screening with AI/AN women. Neither instrument may be appropriate for use in this population, so investigators should examine psychometric properties of both instruments before using them with AI/AN and other underrepresented ethnic minority populations in the U.S.

Issues with PPD screening in AI/AN women may contribute to inaccurate and unreliable prevalence reporting. There are no studies that report on PPD screening in AI/AN women, and no PPD or general depression screening instruments have been validated or otherwise psychometrically evaluated to screen for PPD in AI/AN women. PPD in underrepresented ethnic minorities is a public health priority in the U.S., complicated by what appears to be a stark racial/ethnic disparity. The absence of a culturally and/or linguistically appropriate screening tool raises concern for the accuracy of PPD prevalence reports for AI/AN women. The PHQ-9 needs more validation in screening for PPD in diverse samples of women. Validation of the EPDS and/or the PHQ-9 in underrepresented ethnic minority women in the U.S., particularly AI/AN women, will assist in accurately assessing PPD prevalence in these populations. Finally, despite the issues with PPD screening for AI/AN women (including the need for further research), it is still clinically important that AI/AN women are screened for PPD, that appropriate referrals to care are made when indicated, and that follow-up is accomplished in a timely and unwavering fashion. These steps are vital to improve PPD care for AI/AN women.

Cross-cultural research has been conducted for hundreds of years, resulting in a massive and varied body of literature. More specifically, cross-cultural research has focused on measurement and scale development issues for decades. For example, Flaherty et al. (1988) proposed five steps for accomplishing cross-cultural equivalence in the context of instrument adaptation. More recently, Sidani, Guruge, Miranda, Ford-Gilboe, and Varcoe (2010) developed a five-phase, integrative method for exploring conceptual equivalence (as part of the process of cross-culturally adapting and translating instruments) during their work concerning the health effects of intimate partner violence in Sri Lankan Tamil women.

Given the issues surrounding PPD prevalence in AI/AN women, a logical next step is determining the cross-cultural validity of a widely used, globally validated PPD screening instrument such as the EPDS in a sample of AI/AN women. Cross-cultural adaptation advances the science of comparative effectiveness research in the area of PPD in AI/AN women, and therefore a logical next step is conceptual equivalence of PPD for these women. Equivalence concerns the degree to which an adapted and/or translated measure is comparable to the original measure (Polit & Yang, 2016). Conceptual equivalence is a more specific type of equivalence that is concerned with whether the concept being measured even exists in the target culture, and if so, its relevance and the extent to which it has similar meaning in that culture (Polit & Yang, 2016; Sidani et al., 2010). Conceptual equivalence can been visualized as being on a continuum, where one end represents 100 percent agreement of the existence and meaning of a concept between the source (the culture in which the concept and measure were originally developed) and target cultures, and the other end represents zero percent agreement – where the concept does not exist in the target culture (Polit & Yang, 2016; Sidani et al., 2010). While there are other types of equivalence to consider in adapting an instrument, conceptual equivalence is the most important, and often the first step in the cross-cultural adaptation process (Gjersing, Caplehorn, & Clausen, 2010; Polit & Yang, 2016; Sidani et al., 2010; Waltz, Strickland, & Lenz, 2010).

Limitations for this review are few. The major limitation was prohibiting prenatal/antenatal depression research from inclusion, because many investigations combine prenatal and postpartum depression as various measures or variables. However, research surrounding PPD in AI/AN women is severely limited, and research regarding prenatal depression in AI/AN women is nonexistent. Therefore, PPD was chosen as the primary focus for this review.

Future Directions

The literature reveals a variety of interventions for PPD treatment; currently, standard PPD treatment involves antidepressant medication, psychotherapy, or both (Dennis & Dowswell, 2013). However, no studies report on the effectiveness of standard PPD treatment in AI/AN women. This lack of evidence substantiates the need for further research surrounding not only the effectiveness of standard PPD treatment for these women, but also desired and/or preferred treatments based on cultural preference. Exploring the acceptability, compatibility, and feasibility of integrating traditional native healing into current interventions and treatment for PPD with AI/AN women is another area for future investigation.

Lastly, future studies should explore the role of acculturation in AI/AN women's experiences of PPD, as level of acculturation may impact their PPD risk and therefore prevalence. Acculturation has been studied rarely in the context of PPD and not at all for AI/AN women in that same context. Results in studies examining the relationship between PPD and acculturation are contradictory. For example, Beck, Froman, and Bernal (2005) found no statistically significant relationship between acculturation and PPD or the presence of PPD symptoms. Yet other studies report with more acculturation, a woman's risk of PPD increases (Heilemann, Frutos, Lee, & Kury, 2004; Martinez-Schallmoser, Telleen, & MacMullen, 2003). These studies were conducted with Latina women, and no studies have been conducted that examine the relationship between acculturation and PPD in samples of AI/AN women. This begs the question: Does a relationship exist between acculturation and PPD for AI/AN women? Further, the type of relationship may depend upon the cultural traditions and beliefs to which AI/AN women more strongly ascribe. Furthermore, acculturation scales have not been validated in samples of AI/AN women. Given that acculturation has been associated with an increased risk of PPD in other minority women, it is possible that the same will be true for AI/AN women. Perhaps a woman's level of acculturation could be a partial explanation for the disparity seen in PPD prevalence, where AI/AN women have higher rates than the general U.S. population of women. There is a compelling need for further PPD research with AI/AN women.

CONCLUSION

The low predictive accuracy of the EPDS and the PHQ-9 in samples of culturally diverse women suggests these tools may be culturally biased. Neither instrument may be appropriate for use with AI/AN samples of women. As a consequence, the absence of culturally and/or linguistically appropriate PPD screening tool raises concern about the assessment of PPD among AI/AN women and about the reported prevalence of PPD in AI/AN women. Future research should examine the validity of these screening tools with AI/AN postpartum women and guide the development of more culturally appropriate tools, if needed.

REFERENCES

Adams, K. A., & Lawrence, E. K. (2015). *Research methods, statistics, and applications*. Los Angeles, CA: Sage.

Agency for Healthcare Research and Quality. (2013). *Postpartum depression screening improves some maternal outcomes: Women's health.* Retrieved from https://archive.ahrq.gov/news/newsletters/research-activities/13jun/0613RA38.html

Agoub, M., Moussaoui, D., & Battas, O. (2005). Prevalence of postpartum depression in a Moraccan sample. *Archives of Women's Mental Health, 8,* 37-43. http://dx.doi.org/10.1007/s00737-005-0069-9

American Psychiatric Association [APA]. (2013). Depressive disorders. In *Diagnostic and statistical manual of mental disorders* (5th ed., pp. 155-188). Arlington, VA: American Psychiatric Association.

Areias, M. E. G., Kumar, R., Barros, H., & Figueiredo, E. (1996). Comparative incidence of depression in women and men, during pregnancy and after childbirth: Validation of the Edinburgh Postnatal Depression Scale in Portuguese mothers. *British Journal of Psychiatry, 169,* 30-35. Retrieved from http://bjp.rcpsych.org/

Armola, R. R., Bourgault, A. M., Halm, M. A., Board, R. M., Bucher, L., Harrington, L., . . . Medina, J. (2009). AACN levels of evidence: What's new? *Critical Care Nurse, 29*(4), 70-73. http://dx.doi.org/10.4037/ccn2009969

Arroll, B., Goodyear-Smith, F., Crengle, S., Gunn, J., Fishman, T., Falloon, K., & Hatcher, S. (2010). Validation of PHQ-2 and PHQ-9 to screen for major depression in the primary care population. *Annals of Family Medicine, 8*(4), 348-353. http://dx.doi.org/10.1370/afm.1139

Aydin, N., Inandi, T., Yigit, A., & Hodoglugil, N. N. S. (2004). Validation of the Turkish version of the Edinburgh Postnatal Depression Scale among women within their first postpartum year. *Social Psychiatry and Psychiatric Epidemiology, 39*(6), 483-486. http://dx.doi.org/10.1007/s00127-004-0770-4

Baker, L., Cross, S., Greaver, L., Wei, G., Lewis, R., & CORPS, H. S. (2005). Prevalence of postpartum depression in a Native American population. *Maternal and Child Health Journal, 9*(1), 21-25. http://dx.doi.org/10.1007/s10995-005-2448-2

Beck, C. T., Froman, R. D., & Bernal, H. (2005). Acculturation level and postpartum depression in Hispanic mothers. *The American Journal of Maternal/Child Nursing, 30*(5), 299-304. http://journals.lww.com/mcnjournal/pages/default.aspx

Beck, C. T., Kurz, B., & Gable, R. K. (2012). Concordance and discordance of the Postpartum Depression Screening Scale and Patient Health Questionnaire-9 in an ethnically diverse sample. *Journal of Social Service Research, 38*(4), 439-450. http://dx.doi.org/10.1080/01488376.2012.680840

Benvenuti, P., Ferrara, M., Niccolai, C., Valoriani, V., & Cox, J. L. (1999). The Edinburgh Postnatal Depression Scale: Validation for an Italian sample. *Journal of Affective Disorders, 53,* 137-141. Retrieved from https://www.journals.elsevier.com/journal-of-affective-disorders

Berle, J. Ø., Aarre, T. F., Mykletun, A., Dahl, A. A., & Holsten, F. (2003). Screening for postnatal depression: Validation of the Norwegian version of the Edinburgh Postnatal Depression Scale, and assessment of risk factors for postnatal depression. *Journal of Affective Disorders, 76,* 151-156. http://dx.doi.org/10.1016/S0165-0327(02)00082-4

Bhusal, B. R., Bhandari, N., Chapagai, M., & Gavidia, T. (2016). Validating the Edinburgh Postnatal Depression Screening Scale as a screening tool for postpartum depression in Kathmandu, Nepal. *International Journal of Mental Health Systems, 10,* 71. http://dx.doi.org/10.1186/s13033-016-0102-6

Bina, R. (2008). The impact of cultural factors upon postpartum depression: A literature review. *Health Care for Women International, 29*, 568-592. http://dx.doi.org/10.1080/07399330802089149

Blackburn, S. T. (2013). *Maternal, fetal, and neonatal physiology: A clinical perspective* (4th ed.). St. Louis, MO: Elsevier.

Boyce, P., Stubbs, J. & Todd, A. (1993). The Edinburgh Postnatal Depression Scale: Validation for an Australian sample. *Australian and New Zealand Journal of Psychiatry*, *27*, 472-476. Retrieved from http://journals.sagepub.com/home/anp

Bunevičius, A., Kusminskas, L., & Bunevičius, R. (2009). Validation of the Lithuanian version of the Edinburgh Postnatal Depression Scale. *Medicina*, *45*(7), 544-548. Retrieved from https://www.journals.elsevier.com/medicina/

Carpiniello, B., Pariante, C. M., Serri, F., Costa, G., & Carta, M. G. (1997). Validation of the Edinburgh Postnatal Depression Scale in Italy. *Journal of Psychosomatic Obstetrics & Gynecology, 18*(4), 280-285. http://dx.doi.org/10.3109/01674829709080700

Chang, J. J., Pien, G. W., Duntley, S. P., & Macones, G. A. (2010). Sleep deprivation during pregnancy and maternal and fetal outcomes: Is there a relationship? *Sleep Medicine Reviews, 14*, 1087-1092. http://dx.doi.org/10.1016/j.smrv.2009.05.001

Chibanda, D., Mangezi, W., Tshimanga, M., Woelk, G., Rusakaniko, P., Stranix-Chibanda, L., …Shetty, A. K. (2010). Validation of the Edinburgh Postnatal Depression Scale among women in a high HIV prevalence area in urban Zimbabwe. *Archives of Women's Mental Health*, *13*, 201-206. http://dx.doi.org/10.1007/s00737-009-0073-6

Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological Assessment*, *6*(4), 284-290. http://dx.doi.org/10.1037/1040-3590.6.4.284

Committee on Obstetric Practice. (2015). The American College of Obsetricians and Gynecologists committee opinion no. 630: Screening for perinatal depression. *Obstetrics & Gynecology*, *125*(2), 1268-1271. http://dx.doi.org/10.1097/01.AOG.0000465192.34779.dc

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, *150*, 782-786. http://dx.doi.org/10.1192/bjp.150.6.782

Davis, K. Pearlstein, T., Stuart, S., O'Hara, M., & Zlotnick, C. (2013). Analysis of brief screening tools for the detection of postpartum depression: Comparisons of the PRAMS 6-item instrument, PHQ-9, and structured interviews. *Archives of Women's Mental Health, 16*, 271-277. http://dx.doi.org/10.1007/s00737-013-0345-z

Dennis, C. L., & Dowswell, T. (2013). Psychosocial and psychological interventions for preventing postpartum depression. *Cochrane Database of Systematic Reviews* (2). http://dx.doi.org/10.1002/14651858.CD001134.pub3

DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). Los Angeles, CA: Sage.

Eberhard-Gran, M., Eskild, A., Tambs, K., Schei, B., & Opjordsmoen, S. (2001). The Edinburgh Postnatal Depression Scale: Validation in a Norwegian community sample. *Nordic Journal of Psychiatry, 55*, 113-117. Retrieved from http://www.tandfonline.com/loi/ipsc20

Ekeroma, A. J., Ikenasio-Thorpe, B., Weeks, S., Kokaua, J., Puniani, K., Stone, P., & Foliaki, S. A. (2012). Validation of the Edinburgh Postnatal Depression Scale (EPDS) as a screening tool for postnatal depression in Samoan and Tongan women living in New Zealand. *The New Zealand Medical Journal*, *125*(1355), 41-49. Retrieved from https://www.nzma.org.nz/journal

Ertel, K. A., Rich-Edwards, J., & Koenen, K. C. (2011). Maternal depression in the United States: Nationally representative rates and risks. *Journal of Women's Health*, *20*(11), 1609-1617. http://dx.doi.org/10.1089/jwh.2010.2657

Felice, E., Saliba, J., Grech, V., & Cox., J. (2006). Validation of the Maltese version of the Edinburgh Postnatal Depression Scale. *Archives of Women's Mental Health, 9*, 75-80. http://dx.doi.org/10.1007/s00737-005-0099-3

Figueira, P., Corrêa, H., Malloy-Diniz, L., & Romano-Silva, M. A. (2009). Edinburgh Postnatal Depression Scale for screening in the public health system. *Revista de Saúde Pública*, *43*(Suppl 1), 1-5. Retrieved from https://www.nzma.org.nz/journal

Flaherty, J. A., Gaviria, F. M., Pathak, D., Mitchell, T., Wintrob, B., Richman, J. A., & Birz, S. (1988). Developing instruments for cross-cultural psychiatric research. *The Journal of Nervous and Mental Disease*, *176*(5), 257-263. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/3367140

Flynn, H. A., Sexton, M., Ratliff, S., Porter, K., & Zivin, K. (2011). Comparative performance of the Edinburgh Postnatal Depression Scale and the Patient Health Questionnaire-9 in pregnant and postpartum women seeking psychiatric services. *Psychiatry Research, 187*, 130-134. http://dx.doi.org/10.1016/j.psychres.2010.10.022

Fuggle, P., Glover, L., Khan, F., & Haydon, K. (2002). Screening for postnatal depression in Bengali women: Preliminary observations from using a translated version of the Edinburgh Postnatal Depression Scale (EPDS). *Journal of Reproductive and Infant Psychology, 20*(2), 71-82. http://dx.doi.org/10.1080/02646830220134603

Garcia-Esteve, L., Ascaso, C., Ojuel, J., & Navarro, P. (2003). Validation of the Edinburgh Postnatal Depression Scale (EPDS) in Spanish mothers. *Journal of Affective Disorders, 75*, 71-76. http://dx.doi.org/10/1016/S0165-0327(02)00020-4

Gausia, K., Fisher, C., Algin, S., & Oosthuizen, J. (2007). Validation of the Bangla version of the Edinburgh Postnatal Depression Scale for a Bangladeshi sample. *Journal of Reproductive and Infant Psychology*, *25*(4), 308-315. http://dx.doi.org/10.1080/02646830701644896

Gaynes, B. N., Gavin, N., Meltzer-Brody, S., Lohr, K. N., Swinson, T., Gartlehner, G., . . . C., M. W. (2005). *Perinatal depression: Prevalence, screening, accuracy, and screening outcomes. Evidence Report/Technology Assessment No. 119.* (Prepared by the RTI - University of North Carolina Evidence-based Practice Center, under contract no. 290-02-0016.) AHRQ Publication No. 05-E006-2. Rockville, MD: U.S. Department of Health and Human Services. Retrieved from http://archive.ahrq.gov/clinic/epcsums/peridepsum.htm

Ghubash, R., Abou-Saleh, M. T., & Daradkeh, T. K. (1997). The validity of the Arabic Edinburgh Postnatal Depression Scale. *Social Psychiatry and Psychiatric Epidemiology, 32*, 474-476. Retrieved from http://www.springer.com/medicine/psychiatry/journal/127

Gjerdingen, D., Crow, S., McGovern, P., Miner, M., & Center, B. (2009). Postpartum depression screening at well-child visits: Validity of a 2-question screen and the PHQ-9. *Annals of Family Medicine*, *7*, 63-70. http://dx.doi.org/10.1370/afm.933

Gjersing, L., Caplehorn, J. R. M., & Clausen, T. (2010). Cross-cultural adaptation of research instruments: Language, setting, time, and statistical considerations. *BMC Medical Research Methodology*, *10*(13). 1-10. Retrieved from https://www.biomedcentral.com/1471-2288/10/13

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The practice of nursing research: Appraisal, synthesis, and generation of evidence* (7th ed.). St. Louis, MO: Elsevier.

Guedeney, N., & Fermanian, J. (1998). Validation study of the French version of the Edinburgh Postnatal Depression Scale (EPDS): New results about use and psychometric properties. *European Psychiatry*, *13*¸ 83-89. Retrieved from https://www.journals.elsevier.com/european-psychiatry/

Hanlon, C., Medhin, G., Alem, A., Araya, M., Abdulahi, A., Hughes, M.,…Prince, M. (2008). Detecting perinatal common mental disorders in Ethiopia: Validation of the self-reporting questionnaire and Edinburgh Postnatal Depression Scale. *Journal of Affective Disorders, 108*, 251-262. http://dx.doi.org/10.1016/j.jad.2007.10.023

Hanna, B., Jarman, H., Savage, S., & Layton, K. (2004). The early detection of postpartum depression: Midwives and nurses trial a checklist. *Journal of Obstetric*, *Gynecologic, and Neonatal Nursing*, *33*(2), 191-197. http://dx.doi.org/10.1177/0884217504262972

Hanusa, B. H., Scholle, S. H., Haskett, R. F., Spadaro, K., & Wisner, K. L. (2008). Screening for depression in the postpartum period: A comparison of three instruments. *Journal of Women's Health*, *17*(4), 585-596. http://dx.doi.org/10.1089/jwh.2006.0248

Hartley, C. M., Barroso, N., Rey, Y., Pettit, J. W., & Bagner, D. M. (2014). Factor structure and psychometric properties of English and Spanish versions of the Edinburgh Postnatal Depression Scale among Hispanic women in a primary care setting. *Journal of Clinical Psychology*, *70*(12), 1240-1250. http://dx.doi.org/10.1002/jclp.22101

Heck, J. L. (2015). *Social services providers perspectives of American Indian women's experiences of postpartum depression*. Manuscript in preparation.

Heilemann, M. V., Frutos, L., Lee, K. A., & Kury, F. S. (2004). Protective strength factors, resources, and risks in relation to depressive symptoms among childbearing women of Mexican descent. *Health Care for Women International*, *25*, 88-106. http://dx.doi.org/10.1080/07399330490253265

Hennighausen, K., & Lyons-Ruth, K. (2007). Disorganization of attachment strategies in infancy and childhood. In R. Tremblay, R. Barr, & R. Peters (Eds.), *Encyclopedia on Early Childhood Development [online]* (Revised ed., pp. 1-7). Montreal, Quebec: Centre of Excellence for Early Childhood Development..Retrieved from http://www.child-encyclopedia.com/documents/Hennighausen-LyonsRuthANGxp_rev.pdf

Horwitz, S. M., Briggs-Gowan, M. J., Storfer-Isser, A., & Carter, A. S. (2007). Prevalence, correlates, and persistance of maternal depression. *Journal of Women's Health*, *16*(5), 678-691. http://dx.doi.org/10.1089/jwh.2006.0185

Husain, N., Kiran, T., Sumra, A. Zafar, S. N., Rahman, R. U., Jafri, F., …Chaudhry, I. B. (2014). Detecting maternal depression in a low-income country: Comparison of the Self-Reporting Questionnaire and the Edinburgh Postnatal Depression Scale. *Journal of Tropical Pediatrics*, *60*(2), 129-133. http://dx.doi.org/10.1093/tropej/fmt097

Jadresic, E., Araya, R., & Jara, C. (1995). Validation of the Edinburgh postnatal depression scale (EPDS) in Chilean postpartum women. *Journal of Psychosomatic Obstetrics & Gynecology*, *16*, 187-191. Retrieved from http://www.tandfonline.com/loi/ipob20

Kernot, J., Olds, T., Lewis, L. K., & Maher, C. (2015). Test-retest reliability of the English version of the Edinburgh Postnatal Depression Scale. *Archives of Women's Mental Health*, *18*, 255-257. http://dx.doi.org/10.1007/s00737-014-0461-4

Khalifa, D. S., Glavin, K., Biertness, E., & Lien, L. (2015). Postnatal depression among Sudanese women: Prevalence and validation of the Edinburgh Postnatal Depression Scale at 3 months postpartum. *International Journal of Women's Health*, *7*, 677-684. https://dx.doi.org/10.2147/IJWH.S81401

Kheirabadi, G. R., Maracy, M. R., Akbaripour, S., & Masaeli, N. (2012). Psychometric properties and diagnostic accuracy of the Edinburgh Postnatal Depression Scale in a sample of Iranian women. *Iranian Journal of Medical Sciences*, *37*(1), 32-38. Retrieved from http://ijms.sums.ac.ir/index.php/IJMS

Klaus, M., & Kennell, J. (1976). *Maternal-infant bonding*. St. Louis, MO: CV Mosby.

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606-613. https://dx.doi.org/10.1046%2Fj.1525-1497.2001.016009606.x

Lau, Y., Wang, Y., Yin, L., Chan, K. S., & Guo, X. (2010). Validation of the Mainland Chinese version of the Edinburgh Postnatal Depression Scale in Chengdu mothers. *International Journal of Nursing Studies*, *47*, 1139-1151. http://dx.doi.org/10.1016/j.ijnurstu.2010.02.005

Lawrie, T. A., Hofmeyr, G. J., de Jager, M., & Berk, M. (1998). Validation of the Edinburgh Postnatal Depression Scale on a cohort of South African women. *South African Medical Journal*, *88*(10), 1340-1344. Retrieved from http://www.scielo.org.za/scielo.php?script=sci_serial&pid=0256-9574

Lee, D. T. S., Yip, S. K., Chiu, H. F. K., Leung, T. Y. S., Chan, K. P. M., Chau, I. O. L., …Chung, T. K. H. (1998). Validation of the Chinese version of the Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, *172*, 433-437. Retrieved from http://bjp.rcpsych.org/

Leonardou, A. A., Zervas, Y. M., Papageorgiou, C. C., Marks, M. N., Tsartsara, E. C., Antsaklis, A., …Soldatos, C. R. (2009). Validation of the Edinburgh Postnatal Depression Scale and prevalence of postnatal depression at two months postpartum in a sample of Greek mothers. *Journal of Reproductive and Infant Psychology*, *27*(1), 28-39. https://dx.doi.org/10.1080/02646830802004909

Logsdon, M. C., & Myers, J. A. (2010). Comparative performance of two depression screening instruments in adolescent mothers. *Journal of Women's Health*, *19*(6), 1123-1128. https://dx.doi.org/10.1089/jwh.2009.1511

Loscalzo, Y., Giannini, M., Contena, B., Gori, A., & Benvenuti, P. (2015). The Edinburgh Postnatal Depression Scale for fathers: A contribution to the validation for an Italian sample. *General Hospital Psychiatry*, *37*, 251-256. https://dx.doi.org/10.1016/j.genhosppsych.2015.02.002

Lundh, W., & Gylland, C. (1993). Use of the Edinburgh Postnatal Depression Scale in some Swedish child health centres. *Scandinavian Journal of Caring Sciences*, *7*, 149-154. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1471-6712

Mahmud, W. M. R. W., Awang, A., & Mohamed, M. N. (2003). Revalidation of the Malay version of the Edinburgh Postnatal Depression Scale (EPDS) among Malay postpartum women attending the Bakar Bata Health Center in Alor Setar, Kedah, North West of Peninsular Malaysia. *Malaysian Journal of Medical Sciences*, *10*(2), 71-75. Retrieved from http://www.mjms.usm.my/

Martin, A., Rief, W., Klaiberg, A., & Braehler, E. (2005). Valdity of the brief patient health questionnaire mood scale (PHQ-9) in the general population. *General Hospital Psychiatry*, *28*, 71-77. https://dx.doi.org/10.1016/j.genhosppsych.2005.07.003

Martinez-Schallmoser, L., Telleen, S., & MacMullen, N. J. (2003). The effect of social support and acculturation on postpartum depression in Mexican American women. *Journal of Transcultural Nursing*, *14*(4), 329-338. https://dx.doi.org/10.1177/1043659603257162

Mazhari, S., & Nakhaee, N. (2007). Validation of the Edinburgh Postnatal Depression Scale in an Iranian sample. *Archives of Women's Mental Health*, *10*, 293-297. http://dx.doi.org/10.1007/s00737-007-0204-x

Miklush, L., & Connelly, C. D. (2013). Maternal depression and infant development: Theory and current evidence. *The American Journal of Maternal/Child Nursing*, *38*(6), 369-374. https://dx.doi.org/10.1097/NMC.0b013e3182a1fc4b

Montazeri, A., Torkan, B., & Omidvari, S. (2007). The Edinburgh Postnatal Depression Scale (EPDS): Translation and validation study of the Iranian version. *BMC Psychiatry*, *7*(11), 1-6. http://dx.doi.org/10.1186/1471-244X-7-11

O'Connor, E., Rossom, R. C., Henninger, M., Groom, H. C., & Burda, B. U. (2016). Primary care screening for and treatment of depression in pregnant and postpartum women: Evidence report and systematic review for the U.S. Preventive Services Task Force. *JAMA*, *315*(4), 388-406. https://dx.doi.org/10.1001/jama.2015.18948

O'Hara, M., & McCabe, J. (2013). Postpartum depression: Current status and future directions. *Annual Review of Clinical Psychology*, *9*, 379-407. https://dx.doi.org/10.1146/annurev-clinpsy-050212-185612

Odalovic, M., Tadic, I., Lakic, D., Nordeng, H., Lupattelli, A., & Tasic, L. (2015). Translation and factor analysis of structural models of Edinburgh Postnatal Depression Scale in Serbian pregnant and postpartum women - Web-based study. *Women and Birth*, *28*, e31-e35. http://dx.doi.org/10.1016/j.wombi.2015.01.014

Oklahoma State Department of Health. (2008). Maternal depression after delivery in Oklahoma. *Oklahoma Pregnancy Risk Assessment Monitoring System*, *12*(2), 1-6. Retrieved from https://www.ok.gov/health2/documents/Maternal%20Depression%20PRAMSGRAM.pdf

Okun, M. L. (2015). Sleep and postpartum depression. *Journal of Current Opinion in Psychiatry*, *28*(6), 490-496. https://dx.doi.org/10.1097/YCO.0000000000000206

Okun, M. L., Luther, J., Prather, A. A., Perel, J. M., Wisniewski, S., & Wisner, K. L. (2011). Changes in sleep quality, but not hormones predict time to postpartum depression recurrence. *Journal of Affective Disorders, 130*(3), 378-384. https://dx.doi.org/10.1016/j.jad.2010.07.015

Pitanupong, J., Liabsuetrakul, T., & Vittayanont, A. (2007). Validation of the Thai Edinburgh Postnatal Depression Scale for screening postpartum depression. *Psychiatry Research*, *149*, 253-259. http://dx.doi.org/10.1016/j.psychres.2005.12.011

Polit, D. F., & Yang, F. M. (2016). *Measurement and the measurement of change: A primer for the health professions*. Philadelphia, PA: Wolters Kluwer.

Pollock, J. I., Manaseki-Holland, S., & Patel, V. (2006). Detection of depression in women of child-bearing age in non-western cultures: A comparison of the Edinburgh Postnatal Depression Scale and the Self-Reporting Questionnaire-20 in Mongolia. *Journal of Affective Disorders, 92*, 267-271. http://dx.doi.org/10.1016/j.jad.2006.02.020

Pop, V. J., Komproe, I. H., & van Son, M. J. (1992). Characteristics of the Edinburgh Post Natal Depression Scale in the Netherlands. *Journal of Affective Disorders, 26*, 105-110. Retrieved from https://www.journals.elsevier.com/journal-of-affective-disorders

Regmi, S. Sligl, W., Carter, D., Grut, W., & Seear, M. (2002). A controlled study of postpartum depression among Nepalese women: Validation of the Edinburgh Postpartum Depression Scale in Kathmandu. *Tropical Medicine and International Health, 7*(4), 378-382. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-3156

Rowel, D., Jayawardena, P., & Fernando, N. (2008). Validation of the Sinhala translation of Edinburgh Postnatal Depression Scale. *Ceylon Medical Journal*, *53*(1), 10-13. Retrieved from https://cmj.sljol.info/

Santos, I. S., Matijasevich, A., Tavares, B. F., Barros, A. J. D., Botelho, I. P., Lapolli, C., …Barros, F. C. (2007). Validation of the Edinburgh Postnatal Depression Scale (EPDS) in a sample of mothers from the 2004 Pelotas birth cohort study. *Cadernos de Saúde Pública*, *23*(11), 2577-2588. Retrieved from http://www.scielo.br/scielo.php?script=sci_serial&pid=0102-311X&lng=en&nrm=iso

Sawaya, H., Atoui, M., Hamadeh, A., Zeinoun, P., & Nahas, Z. (2016). Adaptation and initial validation of the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) in an Arabic speaking Lebanese psychiatric outpatient sample. *Psychiatry Research*, *239*, 245-252. https://dx.doi.org/10.1016/j.psychres.2016.03.030

Segre, L., Losch, M., & O'Hara, M. (2006). Race/ethnicity and perinatal depressed mood. *Journal of Reproductive and Infant Psychology, 24*(2), 99-106. https://dx.doi.org/10.1080/02646830600643908

Shin, J. S., Park, S.-Y., Cho, S., Chiu, Y.-L., Bang, H., & Berstein, K. S. (2010). Validation of the Patient health Questionnaire-9 Korean version (PHQ-9K) scale for screening depression among Korean Americans in community settings. *Journal of Theory Construction & Testing, 14*, 45-50. Retrieved from http://tuckerpub.com/jtct.htm

Sidani, S., Gurunge, S., Miranda, J., Ford-Gilboe, M., & Varcoe, C. (2010). Cultural adaptation and translation of measures: An integrated method. *Research and Nursing in Health, 33*, 133-143. https://dx.doi.org/10.1002/nur.20364

Siu, A. L., & U.S. Preventive Services Task Force. (2016). Screening for depression in adults: U.S. Preventive Services Task Force recommendation statement. *JAMA, 315*(4), 380-387. https://dx.doi.org/10.1001/jama.2015.18392

Small, R., Lumley, J., Yelland, J., & Brown, S. (2007). The performance of the Edinburgh Postnatal Depression Scale in English speaking and non-English speaking populations in Australia. *Social Psychiatry and Psychiatric Epidemiology, 42*, 70-78. http://dx.doi.org/10.1007/s00127-006-0134-3

Teng, H.-W., Hsu, C.-S., Shih, S.-M., Lu, M.-L., Pan, J.-J., & Shen, W. W. (2005). Screening postpartum depression with the Taiwanese version of the Edinburgh Postnatal Depression Scale. *Comprehensive Psychiatry, 46*, 261-265. https://dx.doi.org/10.1016/j.comppsych.2004.10.003

Tesfaye, M., Hanlon, C., Wondimagegn, D., & Alem, A. (2010). Detecting postnatal common mental disorders in Addis Ababa, Ethiopia: Validation of the Edinburgh Postnatal Depression Scale and Kessler Scales. *Journal of Affective Disorders, 122*, 102-108. http://dx.doi.org10.1016/j.jad.2009.06.020

The Chickasaw Nation. (n.d.) *The Chickasaw Nation*. Retrieved https://www.chickasaw.net/

Töreki, A., Andó, B., Dudas, R. B., Dweik, D., Janka, Z., Kozinszky, Z., & Kereszturi, A. (2014). Validation of the Edinburgh Postnatal Depression Scale as a screening tool for postpartum depression in a clinical sample in Hungary. *Midwifery, 30*, 911-918. https://dx.doi.org/10.1016/j.midw.2014.02.008

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review, 4*(3), 356-367. https://dx.doi.org/10.1177/1534484305278283

U.S. Department of Health & Human Services, Office of Disease Prevention and Health Promotion. (2016). *Healthy People 2020: Maternal, infant, and child health.* Retrieved from http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives

Uwakwe, R. (2003). Affective (depressive) morbidity in puerperal Nigerian women: Validation of the Edinburgh Postnatal Depression Scale. *Acta Psychiatrica Scandinavica*, *107*, 251-259. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1600-0447

Vivilaki, V. G., Dafermos, V., Kogevinas, M., Bitsios, P., & Lionis, C. (2009). The Edinburgh Postnatal Depression Scale: Translation and validation for a Greek sample. *BMC Public Health*, *9*, 1-11. http://dx.doi.org/10.1186/1471-2458-9-329

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). Other measurement issues. In *Measurement in nursing and health research* (4th ed., pp. 433-475). New York, NY: Springer Publishing Company.

Wei, G., Greaver, L., Marson, S. M., Herndon, C. H., Rogers, J., & Corporation, R. H. (2008). Postpartum depression: Racial differences and ethnic disparities in a tri-racial and bi-ethnic population. *Maternal and Child Health Journal*, *12*, 699-707. https://dx.doi.org/10.1007/s10995-007-0287-z

Werrett, J., & Clifford, C. (2006). Validation of the Punjabi version of the Edinburgh postnatal depression scale (EPDS). *International Journal of Nursing Studies*, *43*, 227-236. http://dx.doi.org/10.1016/j.ijnurstu.2004.12.007

Weobong, B., Akpalu, B., Doku, V., Owusu-Agyei, S., Hurt, L., Kirkwood, B., & Prince, M. (2009). The comparative validity of screening scales for postnatal common mental disorder in Kintampo, Ghana. *Journal of Affective Disorders*, *113*, 109-117. https://dx.doi.org/10.1016/j.jad.2008.05.009

White, G. (2008). A comparison of the Postpartum Depression Screening Scale (PDSS) with the Edinburgh Postnatal Depression Scale (EPDS). *New Zealand College of Midwives Journal*, *39*, 16-32. Retrieved from https://www.midwife.org.nz/resources-events/nzcom-journal

Wickberg, B. & Hwang, C. P. (1996). The Edinburgh Postnatal Depression Scale: Validation on a Swedish community sample. *Acta Psychiatrica Scandinavica*, *94*, 181-184. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1600-0447

Wu, M., Li, X., Feng, B., Wu, H., Qiu, C., & Zhang, W. (2014). Poor sleep quality of third-trimester pregnancy is a risk factor for postpartum depression. *Medical Science Monitor, 20*, 2740-2745. https://dx.doi.org/10.12659/MSM.891222

Yawn, B. P., Pace, W., Wollan, P. C., Bertram, S., Kurland, M., Graham, D., & Dietrich, A. (2009). Concordance of Edinburgh Postnatal Depression Scale (EPDS) and Patient Health Questionnaire (PHQ-9) to assess increased risk of depression among postpartum women. *The Journal of the American Board of Family Medicine*, *22*, 483-491. https://dx.doi.org/10.3122/jabfm.2009.05.080155

Yeung, A., Fung, F., Yu, S.-C., Vorono, S., Ly, M., Wu, S., & Fava, M. (2008). Validation of the Patient Health Questionnaire-9 for depression screening among Chinese Americans. *Comprehensive Psychiatry*, *49*, 211-217. https://dx.doi.org/10.1016/j.comppsych.2006.06.002

ACKNOWLEDGEMENTS

Jennifer L. Heck is a 2014-2016 Women Child Health Initiative Predoctoral Scholar and a Jonas Scholar Nurse Leader, 2016-2018 cohort. The financial support received through these awards funded this work. Additionally, the mentoring and editorial and other support provided by Barbara Carlson, PhD, RN, The Bob and Doris Klabzuba Professor of Nursing, and Barbara Holtzclaw, PhD, RN, FAAN, Associate Dean of Research, was invaluable and forever appreciated.

AUTHOR INFORMATION

Jennifer L. Heck is a doctoral candidate at the University of Oklahoma Health Sciences Center College of Nursing in Oklahoma City, OK and is employed with East Central University School of Nursing in Ada, Oklahoma as a program coordinator for the pre-licensure BSN program.

Appendix A. Summary Tables of PHQ-9 and EPDS Studies

Table A1
Summary of PHQ-9 Studies (*n* = 7)

First Author (year)	Level of Evidence	Location	Discipline(s)	Sample	Diagnostic Criteria/ Instrument	Cronbach's alpha	Cut-off Score(s)
Beck (2012)	C	U.S.	Nursing, Social Work, Education	80 low-income, ethnically diverse mothers	N/A	0.88	Not reported (NR)
Davis (2013)	B	U.S.	Medicine	1011 postpartum (PP) women	Structured Clinical Interview for the DSM-IV (SCID-IV)	NR	12
Flynn (2011)	C	U.S.	Psychiatry	104 PP women	N/A	0.85	10 or higher
Gjerdingen (2009)	C	U.S.	Psychiatry, Public Health	506 PP women	SCID-IV	NR	10 or higher
Hanusa (2008)	C	U.S.	Psychiatry, Nursing, OB-GYN	123 PP women	Diagnostic Interview Schedule	NR	10
Kroenke (2001)*	C	U.S.	Medicine	580 men & women in primary & OB-GYN settings	Mental health professional structured psychiatric interview	0.89, 0.86	10
Weobong (2009)	B	Ghana	Psychiatry, Medicine	160 PP women	Comprehensive Psychopatho-logical Rating Scale	0.79	4/5
Yawn (2009)	C	U.S.	Medicine, Nursing, Public Health	481 PP women	N/A	NR	NR

*Original validation study with major depressive disorder, not postpartum depression.

Table A2
Summary of EPDS Studies (*n* = 54)

First Author (year)	Level of Evidence	Location	Discipline(s)	Sample	Diagnostic Criteria/ Instrument	Cronbach's alpha	Cut-off Score(s)
Agoub (2005)	C	Morocco	Psychiatry	144 mothers	Mini International Neuropsychiatric Interview (MINI)	Not reported (NR)	12
Areias (1996)	C	Portugal	Psychiatry	54 women & men at 12 months PP	Research Diagnostic Criteria (RDC); Schedule for Affective Disorders and Schizophrenia	NR	10

Table A2
Summary of EPDS Studies (*n* = 54)

First Author (year)	Level of Evidence	Location	Discipline(s)	Sample	Diagnostic Criteria/ Instrument	Cronbach's alpha	Cut-off Score(s)
Aydin (2004)	C	Turkey	Psychiatry, Public Health	341 PP women	Diagnostic & Statistical Manual of Mental Disorders, fourth edition (DSM-IV); Structured Clinical Interview for the DSM-IV (SCID)	0.72	12.5
Benvenuti (1999)	C	Italy	Psychiatry	113 PP women	Diagnostic & Statistical Manual of Mental Disorders, third edition (DSM-III); MINI	0.7894	8/9
Berle (2003)	C	Norway	Psychology, Psychiatry	100 PP women	DSM-IV; MINI	0.87	11
Bhusal (2016)	C	Nepal		346 PP mothers	The International Classification of Diseases, 10th revision (ICD-10)	0.74	12/13
Boyce (1993)	C	Australia	Psychiatry	103 PP women	Diagnostic Interview Schedule (DIS)	NR	12.5
Bunevičius (2009)	C	Lithuania	Medicine	94 women	Composite International Diagnostics Interview (CIDI) Short-Form	0.83	7
Carpiniello (1997)	C	Italy	Psychiatry	61 PP women	Clinical Interview Present State Examination	NR	9/10
Chibanda (2010)	C	Zimbabwe	Medicine	210 PP women with and without HIV infection	DSM-IV	NR	11
Cox (1987)	C	UK	Psychiatry, Psychology	84 mothers	RDC	0.87	9/10
Eberhard-Gran (2001)	C	Norway	Public Health	56 PP women	DSM-IV; Primary Care Evaluation of Mental Disorders	0.81	10
Ekeroma (2012)	C	New Zealand	Psychiatry	85 Samoan women & 85 Tongan women	World Health Organization Composite International Diagnostic Interview version 3	0.86	10
Felice (2006)	C	Malta	Psychiatry, Pediatrics	239 PP women	Diagnostic Criteria for Research -10	NR	11/12

Table A2
Summary of EPDS Studies (*n* = 54)

First Author (year)	Level of Evidence	Location	Discipline(s)	Sample	Diagnostic Criteria/ Instrument	Cronbach's alpha	Cut-off Score(s)
Figueira (2009)	C	Brazil	NR	245 mothers	Mini-Plus 5.0	0.87	10
Flynn (2011)	C	USA	NR	104 PP women	NR	0.84	13
Fuggle (2006)	C	UK & Bengal	NR	48 PP women	NR	0.73	NR
Garcia-Esteve (2003)	C	Spain	Psychiatry, Psychology, Public Health	261 PP women	DSM-IV; SCID	NR	10/11
Gausia (2007)	C	Bangladesh	Public Health	100 PP women	DSM-IV;SCID	0.84	10
Ghubash (1997)	C	United Arab Emirates	Psychiatry	95 PP women	Catego definition of depression	0.84	10
Guedeney (1998)	C	France	Psychiatry	87 PP women	RDC	0.76	10.5
Hanlon (2008)	C	Ethiopia	Psychiatry; Medicine	101 PP women	Comprehensive Psychopathological Rating Scale (CPRS)	0.47	5/6
Hanusa (2008)	C	USA	Psychiatry; Nursing; OB/GYN	123 PP women	DIS	NR	10
Hartley	C	USA	Psychology	220 Hispanic women with infant aged 0-10 months	NR	0.84	NR
Husain (2014)	C	Pakistan	NR	601 mothers	ICD-10; Clinical Interview Schedule-Revised (CIS-R)	NR	14
Jadresic (1995)	C	Chile	Psychiatry	108 middle-class mothers	RDC	0.77	9/10
Kernot (2015)	C	Australia	NR	118 PP women	NR	NR	NR
Khalifa (2015)	C	Sudan	Community Medicine; Public Health	238 PP women	DSM-IV; MINI	NR	12
Kheirabadi (2012)	C	Iran	Psychiatry; Psychology; Epidemiology	262 PP women	Hamilton Depression Rating Scale (HDRS)	0.79	12
Lau (2010)	C	China	Nursing	300 PP women	DSM-IV-TR; SCID	0.78	10.5
Lawrie (1998)	C	South Africa	OB-GYN; Psychiatry	103 PP women	DSM-IV; SCID & Montgomery-Asberg Depression Rating Scale (MADRS)	NR	11/12
Lee (1998)	C	China	OB-GYN; Psychiatry	145 PP women	DSM-III-R; SCID	NR	9/10
Leonardou (2009)	C	Greece	Psychiatry	81 PP women	DSM-III-R; SCID	0.9	11/12

Table A2
Summary of EPDS Studies (*n* = 54)

First Author (year)	Level of Evidence	Location	Discipline(s)	Sample	Diagnostic Criteria/ Instrument	Cronbach's alpha	Cut-off Score(s)
Lundh (1993)	C	Sweden	Psychology	53 mothers	CPRS-Depression	NR	9/10
Mahmud (2003)	C	Malaysia	Psychiatry; Social Development	64 PP women	ICD-10; HDRS	0.86	11/12
Mazhari (2007)	C	Iran	Neuroscience	200 PP women	DSM-IV; Clinical Interviews	0.83	12/13
Montazeri (2007)	C	Iran	Nursing	100 PP women	NR	0.77, 0.86	NR
Odalovic (2015)	C	Serbia	Pharmacy; Public Health	125 PP women	NR	0.83	NR
Pitanupong (2007)	C	Thailand	Psychiatry; OB-GYN	351 PP mothers	DSM-IV; SCID	NR	6/7
Pollock (2006)	C	Mongolia	Health & Social Care; Medicine	94 women	CIS-R	0.84	11/12
Pop (1992)	C	The Netherlands	Medicine; Psychology	293 Caucasian PP women	NR	0.80	NR
Regmi (2002)	C	Nepal	Psychiatry	100 PP women	DSM-IV	NR	13
Rowel (2008)	C	Sri Lanka	Medicine	204 PP women	ICD-10	NR	9
Santos (2007)	C	Brazil	Medicine	378 PP women	ICD-10	NR	10
Small (2007)	C	Australia	NR	1621 PP women	NR	0.8 to 0.87	NR
Teng (2005)	C	Taiwan	Psychiatry; Gynecology	203 PP women	DSM-IV; MINI	0.87	12/13
Tesfaye (2010)	C	Ethiopia	Psychiatry	105 PP women	CPRS	0.71	6/7
Töreki (2014)	C	Hungary	OB-GYN; Psychiatry	266 PP women	DSM-IV; SCID	0.75	12/13
Uwakwe (2003)	C	Nigeria	OB-GYN	225 PP women	ICD-10; CIDI	0.83	9
Vivilaki (2009)	C	Greece	Social Medicine; Nursing; Political Science; Epidemiology	120 mothers	NR	0.804	8
Weobong (2009)	B	Ghana	Psychiatry; Medicine	160 PP women	CPRS	0.79	10/11
Werrett (2006)	C	UK	NR	23 new mothers	ICD-10	0.87	11.5
White (2008)	C	New Zealand	Nursing	60 PP women	DSM-IV; SCID	0.87	9
Wickberg (1996)	C	Sweden	Psychology	128 PP women	MADRS	NR	11.5

FROM AMBIVALENCE TO REVITALIZATION: NEGOTIATING CARDIOVASCULAR HEALTH BEHAVIORS RELATED TO ENVIRONMENTAL AND HISTORICAL TRAUMA IN A NORTHWEST AMERICAN INDIAN COMMUNITY

Ramona Beltrán, MSW, PhD, Katie Schultz, MSW, PhD, Angela R. Fernandez, MSW, LCSW, Karina L. Walters, PhD, Bonnie Duran, DPH, and Tessa Evans-Campbell, MSW, PhD

Abstract: Cardiovascular disease is the number one cause of death among American Indians and Alaska Natives (AI/AN). Utilizing narratives from members of a Pacific Northwest tribe, this paper explores perceptions about behaviors affecting cardiovascular health through tribal members' lived experiences related to place-based environmental historical trauma. Findings from narrative analysis indicate that ambivalence is an effect of historical trauma and complicates the adoption of protective cardiovascular health behaviors. Tribal narratives indicate a path to overcome this ambivalence stemming from historical environmental trauma through revitalization, adaptation, and re-integration of traditional cultural practices to contemporary contexts. By creating their own health promotion response, one that is not imposed or colonizing, tribal members are re-generating cultural practices and health behaviors associated with lowered risks of cardiovascular disease.

INTRODUCTION

Cardiovascular disease (CVD) is a relatively recent phenomenon in American Indian and Alaska Native (AI/AN) communities. AI/AN communities historically reported low rates of CVD (Howard et al., 1999; Howard et al., 1995; Nelson et al., 1990; Rhoades, Rhoades, & Welty, 2000). Since the 1990s, however, incidence rates and CVD-related mortality and morbidity have drastically increased among this population (Brega et al., 2011; Bonow, Grant, & Jacobs, 2005; Lising, 1998; Witmer, Hensel, Holck, Ammerman, & Will, 2004; Rhoades, 2005). This historically unprecedented increase in CVD and related diseases among AI/ANs exceeds the incidence, morbidity, and mortality rates for CVD among the U.S. population at large (Moore et al., 2014). AI/AN populations face elevated risk for CVD due to high rates of smoking, hypertension, high levels of stress, low levels of physical activity, high cholesterol, and diabetes (Brega et al., 2011; CDC, 2015; Harris, Nelson, Muller, & Buchwald, 2015; Jamal et al., 2016; Rajkumar, Fretts, Howard, Yeh, & Clark, 2017). The prevalence of stress is at the helm of these CVD risk factors. AI/AN-specific stressors include exposure to early life trauma, which is linked to the development of depressive and anxiety disorders, including post-traumatic stress disorder (Libby, Orton, Novins, Beals, & Manson, 2005); higher risk for racial discrimination (associated with higher diastolic blood pressure and greater risk for hypertension; Thayer, Blair, Buchwald, & Manson, 2017); and disruptions to social and cultural lifeways through forced assimilation and urbanization, which are perceived by AI/ANs to contribute to risk behaviors including interpersonal violence, substance misuse, and poor nutrition (Evans-Campbell, 2008; Walters, Beltrán, Huh, & Evans-Campbell, 2011; Walters, Mohammed, et al., 2011). While scholars have begun to examine the influence of these stressors on CVD and related diseases among this population, the impact of historical and environmental traumas and their relationship to contemporary trauma, stress, and CVD are under-explored in AI/AN communities. Recent studies have found that disruptions to place-based relationships are associated with emotional distress and impact health and mental health outcomes (Ferreira, 2006; Walters, Beltrán, et al., 2011; Whitbeck, Adams, Hoyt, & Chen, 2004), and the impact of historical environmental traumas on CVD risk among AI/AN communities offers promising new insight on this public health issue.

For many Indigenous peoples, the notion of *place* is embedded in a profound relationship with ancestral lands and intricate sociocultural and spiritual connections to complex webs of creation. The very definition of health and well-being for Indigenous people is intimately connected with place. Often referred to by Indigenous scholars as “Original Instructions” (Deloria, 1992, 1995; Pierotti & Wildcat, 2000), traditional cultural codes of conduct that have shaped tribal health practices are intimately tied to the land, such as hunting and gathering methods, seasonal dietary shifts, land management, and physical engagement with the natural world. Moreover, place and land-based practices are “integral to one’s sense of being which is also central to both individual and collective spiritual health and wellness,” whereas “loss of place (i.e., displacement) is akin to loss of spirit or identity” (Walters, Mohammed, et al., 2011, p. 173). As such, both historical and ongoing disruptions in social, cultural, and physical relationships with place are understood as negatively impacting health and wellness in Indigenous communities and have been cited by scholars as contributing factors to increased stress (Ferreira, 2006; Walters, Mohammed, et al., 2011; Whitbeck et al., 2004), a primary contributor to CVD risk among AI/AN peoples.

Throughout this manuscript, we use the term "place-based" to refer to historical and contemporary traumas associated with loss and revitalization of land/environment/health processes and outcomes.

Utilizing narratives from members of a Pacific Northwest tribe, this paper explores tribal perceptions about behaviors affecting cardiovascular health by examining lived experiences related to place-based environmental historical trauma. For the tribal members interviewed in this study, place is related to both well-being and disease, is historical and contemporary, and is centered somewhere in the middle of cultural disruptions and revitalizations that impact tribal health. In our findings, this ongoing vacillation between lost and reclaimed culture and relationships to place gives rise to a deep ambivalence that impacts tribal members in their decisions to engage in "healthful" cardiovascular behaviors (e.g., healthy diet, increased physical activity, stress reduction; Brega et al., 2011; Rajkumar et al., 2017; Thayer et al., 2016). This ambivalence arises as tribal members struggle to reconcile the complexities of what was, what is, and what will be as they negotiate place-based cultural practices related to cardiovascular health. In this paper, we focus on ambivalence as a tension in reconciling place-based historical loss, current place-based disruptions, and related changes in cardiovascular health behaviors. Our analysis of data from tribal narratives suggests a path to reconciling disrupted relationships to place by illuminating opportunities for adapting and re-integrating place-based traditional cultural practices to contemporary contexts. By revitalizing traditional cultural practices related to place, tribal members are identifying cultural health behaviors with great potential for improving cardiovascular health. Previous studies showing the empirical link between place-based trauma and CVD risk (Walters, Mohammed, et al., 2011; Whitbeck et al., 2004) have not yet illuminated the nuances of the processes leading to poor health and mental health outcomes. The examination of the role of ambivalence in these processes seeks to illuminate aspects of the complex mechanisms that are a part of negotiating place-based historical trauma and CVD risk factors.

Background

Cardiovascular Disease in Indian Country

The primary causes of CVD are the first (heart disease) and seventh (stroke) leading causes of death among AI/ANs (CDC, 2015; Heron, 2016). The strongest risk factors among AI/AN populations include diabetes and stress-related hypertension (Moore et al., 2014; Thayer et al., 2017). Diabetes rates are significantly higher among AI/AN populations and diabetes doubles to quadruples risk of heart disease, compounding risk for CVD (Moore et al., 2014). AI/AN peoples also face greater risk for higher stress levels due to racial discrimination, which contributes another unique risk factor for CVD. Among AI/ANs, racial discrimination is associated with higher diastolic blood pressure and greater risk of hypertension (Thayer et al., 2017). Other general stressors linked to racial discrimination for AI/ANs that may contribute to CVD risk may include limited access to housing, employment, and health care (Krieger, 2012). Racial discrimination not only contributes to increased blood pressure, but is also linked to a constellation of additional risk factors across racial minority groups, including increased cortisol levels (stress hormones; Berger & Sarnyai, 2015; Thayer & Kuzawa, 2015), higher allostatic load (Brody et al., 2014), and lower heart rate variability (Wagner, Lampert, Tennen, & Feinn, 2015).

An emerging consideration of CVD risk is the impact of stressors related to relocation from original tribal homelands (Jervis, Beals, Croy, Klein, & Manson, 2006). These place-based stressors have been demonstrated in research examining anxiety and depression symptoms related to historical trauma (Whitbeck et al., 2004). Federal policies in the 1800s removed tribes from original homelands and placed them on reservations, often in vastly different environments and in places colonial settlers deemed unfit for habitation or use (Walters, Mohammed, et al., 2011; Whitbeck et al., 2004). These policies denied traditional hunting, fishing, and gathering practices and replaced traditional food sources with reliance on commodity foods consisting of dried beans, refined sugar, processed flour, and pig fat (Krohn & Segrest, 2010; Miewald, 1995). These historically-situated disruptions contributed to high-fat, high-calorie diets and low amounts of physical activity, and they persist today. Dominant, Western society continues to render multiple, pervasive assaults on tribal governments to gain control over land, water, minerals, and other raw materials (LaDuke, 1999; Nies, 1996; Smith & Frehner, 2010; Vickery & Hunter, 2016) through targeting tribal lands for dump sites, nuclear and weapons-testing, and resource extraction (e.g., Leonard, 1997; Hooks & Smith, 2004; LaDuke, 1999; Vickery & Hunter, 2016). Ongoing exploitation of ecological environments that contribute to sustainable health and food practices may also contribute to contemporary place-based stressors. In an examination of the Yurok Nation’s resistance to militarized governmental regulations of their fishing rights, Mollie Rudd, a Yurok fisherwoman and activist, describes the stress related to compounding environmental assaults on one of the strongest risk factors for CVD—her diabetes: “My blood sugar goes up just to think of it” (Ferreira, 2006, p. 358). Furthermore, Native people are increasingly vulnerable to the impacts of climate change on food security, traditional knowledge, and tribal control of resources (Vickery & Hunter, 2016). As Native peoples are forced to assimilate and incorporate predominately Western lifestyles such as high-fat, high calorie diets, and low amounts of physical activity, incidence of CVD escalates (Lising, 1998). Understanding historical trauma and its disruption to AI/AN relationships to place not only suggests AI/AN specific risk factors for CVD, it also suggests that the reconciliation of these relationships offers promising potential for lowering CVD risk among this population.

Historical Trauma and Place

Historical trauma is commonly defined as cumulative trauma occurring over the lifespan and across generations resulting from extensive catastrophic events aimed at specific communities (Brave Heart, 1999; Brave Heart, 2003; Duran, Duran, Brave Heart, & Yellow Horse-Davis, 1998; Evans-Campbell, 2008; Evans-Campbell & Walters, 2006; Sotero, 2006; Swinomish Tribal Mental Health Project, 2002; Weaver, 1999). Related social and cultural factors, such as stress caused by forced assimilation, urbanization, and cultural disruptions, are thought to contribute to problematic health behaviors (e.g., substance misuse, interpersonal violence, poor nutrition, and low physical activity) among AI/AN peoples (Evans-Campbell, 2008; Walters, Beltrán, et al., 2011). In general, AI/AN peoples report higher rates of interpersonal trauma and resulting post-traumatic stress disorder when compared to Whites in the U.S. (Bassett, Buchwald, & Manson, 2014). Post-traumatic stress disorder is linked to higher allostatic load for AI/AN adults, increasing their risk of CVD (Thayer et al., 2016).

Though little empirical data exists explaining the impact of environmental aspects of historical trauma, evidence suggests that historical loss of land affects both mental and physical health. In a study with elders from two reservations, Whitbeck and colleagues (2004) explored responses to historical losses and found that 18% of respondents thought about loss of land several times a day or at least daily. Additionally, 10% thought about loss associated with government relocation processes several times a day or daily, and approximately 16% thought about it at least weekly. These thoughts were found to have significant impact on emotional distress, particularly anxiety and depressive symptoms (Whitbeck et al., 2004). Similarly, in a study with urban two-spirit AI/ANs, Walters, Beltrán, Huh, and Evans-Campbell (2011) found that both historical and contemporary place-related stressors impacted overall physical and mental health outcomes. On average, participants thought about place-based traumas including forcible relocation from original Native lands and land loss weekly, and these thoughts were significantly associated with mental and physical health outcomes. Furthermore, these associations maintained significance when controlling for contemporary lifetime traumas such as childhood abuse and military combat

(Walters, Beltrán, et al., 2011). Building on these findings, this study contributes to a growing body of research connecting the impact of place-based historical and contemporary traumas to health, an important line of inquiry in the examination of cardiovascular health disparities among AI/AN populations.

METHODS

The research reported in this paper was part of a project funded by the National Institute of Health, National Heart, Lung, and Blood Institute (U01 HL87322-01). The Healthy Hearts Across Generations Project (həliʔdx^{w}) was a 5-year development project with a Pacific Northwest tribe and the Indigenous Wellness Research Institute at the University of Washington to design and test a culturally appropriate, feasible, and generalizable CVD risk prevention program for American Indians in the Northwest. As a multi-phased mixed methods study, phase 1 included qualitative inquiry to elicit information from community members to determine their experiences with food (traditional indigenous and Western), nutrition, and exercise, as well as common barriers (historical, communal, familial, and individual) and likely facilitators to a CVD prevention program. The analysis in this paper presents findings from the phase 1 qualitative data and focuses on participant experience associated with cultural meanings and practices and barriers related to land, food, and physical activity.

Participants

The study used a purposive sampling strategy to assure that certain sectors of the tribal community were effectively represented (elders and parents with children under the age of 18). Criteria for inclusion required that participants be enrolled elders or adult tribal members with children under the age of 18 and primary residence on or within 20 miles of the reservation. Additional criteria required that participants be at risk for CVD via self-report (i.e., overweight, obesity, diabetes, hypertension, or inflammation disorder). The Project Director/Tribal Liaison identified potential participants who fit the criteria from within established community networks, and the Project Coordinator screened identified participants for inclusion in the study. Final qualitative data included 15 in-depth interviews. Thirteen of the 15 interviews included specific questions related to place and health and were included in this analysis. Of the interviews included in this analysis, participants ranged in age from 32 to 73 years old. Specifically, there were six elders (ages 55-73 years) and seven parents (ages 32-55 years). One participant identified as both an elder and parent because of their role as a primary caretaker of grandchildren. The final sample included 3 men and 10 women.

Procedures

All aspects of the research in the Healthy Hearts project included several levels of research accountability and community engagement to assure cultural relevance. Before data collection began, a research protocol agreement was developed between the tribal community and the Institute, requiring that all study related materials, including surveys and interview guides, be reviewed and approved prior to implementation. The site Principal Investigator, a tribal member and community leader, was appointed by the tribe to ensure cultural accountability and adherence to the research protocol agreement and provided oversight of Project Director/Tribal Liaison activities relative to cultural protocols. The Project Director/Tribal Liaison sought guidance of community members and a community advisory board in developing study materials with researchers. Additionally, the research protocol agreement stipulated that all abstracts, presentations, or publications from study data be reviewed and approved by the Project Director/Tribal Liaison in collaboration with the site Principal Investigator.

After interview guides were approved, semi-structured in-depth interviews were conducted asking participants to reflect on their understanding and experience of the relationship between place and health (e.g., what is your relationship with the land and how do you feel it affects your health?). The interview guide also included questions about the cultural meanings of food, access to healthy food and physical activity, and parenting attitudes and interactions around eating and activity levels of children. All individuals conducting interviews identified as Native or Indigenous and included research faculty, staff, and graduate students. Interviewers attended an intensive two-day qualitative interviewing training with a manual developed specifically for the project and were given copies of the training manual and interview guides to review. Training modules included instruction on interview skills (establishing trust, listening, giving neutral feedback, using non-biased probes for clarification, and taking notes); informed consent; audio taping; addressing power, privilege, and oppression; recruitment; data management safety; safety protocol; and finally, the Healthy Hearts in-depth interview guide.

Research interviews were conducted at the Institute, the tribal health site, and various homes and community settings located on the tribal reservation. They generally lasted between

45 minutes and 2 hours, depending on the level of detail shared. Interviews were audio taped and transcribed by a professional transcriber. Həliʔdx^{w} research staff then cleaned transcripts, which included crosschecking transcripts with audiotapes to ensure that transcription accurately reflected narratives. It also included de-identifying names, places, or specific events that might risk confidentiality. Pseudonyms were used to ensure confidentiality, and specific sociodemographic, geographic specificity, and tribal identifiers were omitted. Due to the small community size and confidentiality concerns, qualitative findings were presented to the general community in several community gatherings (e.g., tribal college presentation and tribal health conference presentation). Presentations shared broad thematic findings and received affirmation from community members of cultural credibility.

Analytical Approach

A common assumption of narrative inquiry is that telling stories is one of the primary ways people build and convey meaning (Mischler, 1986). It explores ways stories are told by considering the position/identity of the storyteller, arc and/or sequencing of events, relevant characters, starting and ending points, and revelations of specific events and details (Riley & Hawe, 2005). Narrative analysis allows researchers “to see different and sometimes contradictory layers of meaning, to bring them into useful dialogue with each other, and to understand more about individual and social change” (Andrews, Squire, & Tamboukou, 2013; p. 1). The use of loosely formed questions with guided probes allowed narratives of place/health relationships to unfold as experienced by each participant. Interviews were coded for salient story themes using an open coding process to establish broad primary narrative categories (e.g., disconnection from land). After the initial coding process was complete, an in-depth narrative analysis was utilized to illuminate more intricate story themes, allowing for subtle nuances of individual and collective narratives to emerge with particular focus on turning points in the narrative arcs.

Negotiating Ambivalence

We anticipated that tribal members would articulate instances verifying the idea that multiple forms of historical trauma (e.g., physical, cultural, spiritual, environmental) were related to experiences of *place* (land) and that these experiences affected their health on multiple levels (e.g., mental, physical, spiritual). While initial assumptions held true, they did not capture the full depth and breadth of articulated experiences. The overarching narrative was one of profound *ambivalence*–tribal members often expressed contradictory feelings about their traditional, historical, and contemporary relationships to place, each other, and their health. However, there was also a turning point in the narrative arc across all interviews in which tribal members described a specific traditional ceremony that they connected to positive cardiovascular health behaviors. Within this turning point, ambivalence appeared to attenuate and narratives joined, offering insight into the ways in which culturally rooted and responsive health practices embedded in the ceremony could play a role in addressing CVD risk in AI/AN communities.

Ambivalence is a common human experience characterized by conflicting emotions toward a person or thing. It is expressed as the simultaneous experience of both positive and negative feelings that can cause individuals to feel pulled in different directions. The use of the term in psychiatry is attributed to Swiss psychiatrist Eugen Bleuler who first used the term to describe "negativism" and later argued that ambivalence is also a phenomenon of everyday life (Luscher, 2002). Moreover, Luscher (2002) describes ambivalences as "challenges to be responded to" (p. 587). Ambivalence has been found to be both a potential barrier in reducing alcohol misuse (Yuan et al., 2010), as well as a significant factor in resolving risky health behaviors including alcohol abuse (Spicer, 1997), tobacco use (Amos, Wiltshire, Haw, & McNeill, 2006; Toussaint, VanDeMark, Silverstein, & Stone, 2009), and eating disorders (Reid, Burr, Williams, & Hammersley, 2008) as contemplation of, readiness for, and resistance to change can co-exist simultaneously. The analysis presented in this paper is virtually the first to consider the role of ambivalence in AI/AN cardiovascular health within the literature. Themes emerging from tribal members' narratives related to CVD illuminate dissonance between the cultural health practices of the past and conditions of the present. As Luscher (2002) says, "Insight into ambiguity of a concept is a motor for the development of new ideas" (p. 585). This ambivalence presents opportunities for identification and development of new approaches to cardiovascular health practices among tribal members.

RESULTS

Interrupting Original Instructions: Remembering What Was

Tribal members spoke of the value of land, loss of land, health, food, activity, cultural loss, and spirituality interchangeably and in both positive and negative terms. When asked specifically about the meaning of the relationship between land and health, an elder stated, "It means everything." He continued by reflecting on the historical relationship to land while noting tensions to that relationship due to colonization:

> We didn't understand when they signed the treaty how a white man could own land because the land belonged to everybody, provided all these ingredients that feed you and support you in life. Even a tree, the cedar tree here made canoes or long houses. The roots made baskets. The bark made rope and clothes. We respected all that, you know, and it all come from the land. (CARL – ELDER)

Pearl, an elder, described her contemporary relationship with the land as a "very close relationship…very, very close relationship." For several tribal members, this closeness was difficult to articulate, and because of the deep ancestral and ecological knowledge embedded in the specific locality of place, nearly impossible to explain:

> Well, I think there's a deep-rooted connection to the land. This is where we come from. This is where my ancestors are. And it's just a very deep, more than I think other people would say. I lived here for generations, you know. For us, it's like almost a birthplace. It's a deep perspective that I don't think you can put into words, because it has a lot of cultural and spiritual meaning that you can't really say in the English language. (KAREN – PARENT)

This deep connection, so deeply rooted to render it almost impossible to describe, makes forced removal and loss of land such a harmful aspect of AI/AN history and the legacy of historical trauma and resulting losses of preventive health practices. It also leads to feelings of ambivalence as tribal members narrate their relationship to land as both extremely important and affected by historical trauma.

Ambivalent Kinship: Reconciling What Is

Throughout the narratives, there was consistent dissonance between the love of land and struggles associated with tending to the relational and health aspects of land in a context of Western values and policies. Much of current daily life has been influenced or created by modern Western ideology, which has altered the infrastructure of traditional Native life (Stephens, Nettleton, Porter, Willis, & Clark, 2005). As such, many of the tribal members described difficulty living in accordance to original instructions regarding traditional, cultural land and health practices. Although the land was understood to have curative properties and be a source of "medicine" through medicinal plants and traditional healing ceremonies, tribal members described obstacles to accessing its healing qualities as access to traditional land has been impacted by development, pollution, and non-tribal "ownership."

One participant's description of the Bay located next to the reservation provides an illustration of this dissonance; while she described how drinking water on the reservation is risky to her health, she simultaneously could not imagine life away from the Bay. "I'm really not comfortable with the *drinking* water. But I think…living so close to the water…In my lifetime I cannot imagine living somewhere where there's no water" (SARA – PARENT). Elder Cora remarked that even the smell of the drinking water evokes fear for health: "It's getting scary how our land and our water…You can't even hardly drink out of your own faucet without thinking it smells real bad sometimes… smells so much of chlorine." This regard for water, while also dealing with unsafe drinking water, demonstrates a dissonance that leads to feelings of ambivalence among tribal members.

Contemporary Western ideology and lifestyles are oriented to time, progress, and products while those of Indigenous peoples are oriented to relational qualities of place (Pierotti & Wildcat, 2000; Walters, Beltrán, et al., 2011). This contrast created ambivalence for tribal members who want to live in accordance to their cultural values, yet bound by current context must act against those values:

> Without the land, the water, and the air, I don't think we'd be able to exist. Yet, on the other hand, without our vehicles we wouldn't be able to exist either, but that does a lot of contamination with our vehicles and we could have things happen with our car that would contaminate the soil and the water. We have to watch out what we do with our land, and even at our own homes, our HUD homes, we can't dig around in there because we don't know if we're gonna run into the wires or the pipelines or whatever. So there's not very many things that we can do any more. Before we were given a place to live, we could do anything we wanted with our land. Like a long time ago, they used to bury [relatives] right in their backyard. [Families had] their own cemetery. And there's only very few places now that people do live with their own people buried in the backyard. (CORA – ELDER)

Not only are people unable to engage in traditional cultural practices on their land, the land also holds painful memories of historically traumatic events and related disruptions in family and social cohesion, a noted outcome of historical trauma (Evans-Campbell, 2008). While Karen described “political dirtiness” and “getting attacked by your own family members” as a painful part of being on tribal land, she also described the reservation as the place where those same family members come together to pray and celebrate.

> You know what? It’s both good and bad for me. It’s like one of the worst places for me, and it’s one of the best. It’s one of the worst, because it has historical trauma here. And it has the boarding school. It has like death on the roads. It has dead relatives. It just has the hard aspects. Political dirtiness. The trying to fight for tribal rights, but the struggle… And it also has the ceremony when tables come together and people celebrate. It also has that aspect, that we know we’re family. We know we’re connected, and we love each other. We come together when we need to. But it’s also very devastating when you’re going through a hard time like say, your job, because these are your family and, you know, get attacked by your own family members. It’s harder. (KAREN – PARENT)

Reconciling these conflicts and the resulting ambivalence within relationships is complicated. The ways tribal members relate to the land and, consequently, to each other continue to be affected by colonization, ongoing imposition of Western ways of being, and complex experiences of historical trauma—stressors which may increase tribal members’ risk for CVD.

The Impact of Western Development on Indigenous Health

Development has also impacted the ability to maintain traditional healthy living for most Native peoples. When asked how the relationship to land affects physical health, some tribal members responded by talking about destruction of land and prioritizing of development. One elder stated: “It’s changing so much. You can’t do what you used to do ’cause everything’s changed. And the land developers are doing everything to destroy the ecosystem” (CARL – ELDER). Indigenous peoples have a history of sophisticated technology that worked in cooperation with the land. “In the places they lived and with their awareness of the Earth as a living organism, Native people developed sophisticated technologies to make their lives easier and more efficient” (Cajete, 2000, p. 188). Native communities had industries such as mining, irrigation, agriculture, and even transportation; however, in contrast to many contemporary industries, they used the land so that it could regenerate (Cajete, 2000). The tribe involved in this study, for example, previously had successful sustainable fishing and timber industries that worked in accordance to the seasons and ensured ongoing abundance (Krohn & Segrest, 2009; Thrush, 2000). Carl explained changes to the land as a result of colonization and subsequent industry:

> Well, you know we conceded all this land to the United States government, and they raped our resources. Like this used to be a great, great timber industry and fishing industry, and they destroyed it all. You look at the mountains, you won't see no more trees. You look in the water, you don't see no more salmon. (CARL – ELDER)

Modern development and the resulting disconnection from traditional healthy behavioral practices changed the way people obtain and prepare food and thus, how they relate to it:

> It's just different now from when I was growing up. It really is. *It used to be part of us* and we used to hunt, fish. They'd kettle mussels and sit there [by] the fireplace and now it's all different. (SUE – ELDER)

Tribal members also discussed the impacts of colonization on food preparation and physical health:

> People around here… everything's fried if you go in their [homes]. [Before] my cousins, they were growing their food, they were canning all these fruits. You don't see that anymore. They go to [the grocery store] and buy the junk food. What do you call that? Top Ramen? They don't have time. And it's so busy here. I've never had that stuff…the ingredients… all salt. (SUE – ELDER)

Sue explained that the traditional food and cooking practices she learned from her elders have been replaced with processed and fast food:

> I just learned [from] my grandfather [who] hunted. He had fruit trees. We grew our own chickens and my mother made bread. We used to pick the berries… And I don't see 'em doing that anymore. Now it's through [the grocery store]. We used to eat everything off the land, eat the berries, the cherries. I don't think we had microwaves. We had the old wood stoves, we cooked out of it, [we'd] make bread in the oven and it'd come out perfect. I think it's all the fast food they're eating. (SUE – ELDER)

These experiences associated with Western land development and imposition of Western diet and eating behaviors anchor tribal narratives in a space of loss and diminishing opportunities for healthy cardiovascular behaviors. While these elders retain some traditional knowledge of healthful land and diet practices that could be shared with community, a subtle sense of helplessness to affect positive cardiovascular health behaviors was expressed, leaving them in a space of ambivalence between loss and possibility.

Transcending Ambivalence: Negotiating Integration of Original Instructions through Cultural Revitalization

While tribal members articulated cultural loss and disruption, they also described pride in their survival and hope for a better future for their people. Although vacillation between struggle and strength was prominent throughout all the interviews, there was a narrative turning point when tribal members were asked to reflect upon strengths associated with tribal relationships between land and health. In this instance, all responses emphasized the importance of revitalization of traditional customs, including practices related to cardiovascular health (e.g., diet, physical movement, spirituality). Specifically, each participant described the importance of the First Salmon Ceremony in relation to land and health.

In 1974, the Boldt decision gave Washington Tribes the right to co-manage fishing in tribal areas and to keep 50% of harvestable fish (Brown, 2005). Revitalized in 1979 after the U.S. Supreme Court upheld the Boldt decision, the First Salmon Ceremony is an annual ceremony honoring the seasonal return of salmon and tribal fishers. Including ceremonial songs and dances, tribal members begin the ceremony by welcoming a traditional canoe carrying the "first salmon." The salmon is then carried to a communal dining area where a salmon feast is offered to the community. When the meal is concluded, the bones of the first salmon are carried back to the water by canoe (Amoss, 1987; Brown, 2005).

Even when participants did not describe themselves as having traditional cultural knowledge, every participant in this study described the First Salmon Ceremony as an important and unique cultural event related to traditional health practices. One participant explained how learning cultural traditions could help tribal members understand and achieve greater respect for the natural environment and consequently, their own health:

> What they call the Salmon Ceremony…is a cultural event every year with the first salmon. They catch salmon, bring it up, and will say a prayer. I didn't grow up with any of that but as far as the community knowing language and knowing stories of our ancestors, say creation stories or things like that, learning the culture would help people to respect earth and to respect their bodies. (MICHELLE – PARENT)

There was also pride that young people were beginning to understand the implications of the ceremony. This parent's description of her experience with her children suggests that intergenerational learning about traditional practices is valued by tribal members and, as such, may be an opportunity for integration in revitalization efforts in addressing cardiovascular health:

> We go to the salmon ceremony every year and this year is first year that [my children] actually understood what we were doing it for. Before they just thought it was fun to go dance and sing. They were just more aware of what they were doing this year. Before they would say, "Well, why are we sending the (bones) back out there, Mom?" And no matter if I explained it to 'em or somebody else explained it to 'em they just never really got it, but this year it finally clicked for both of 'em. That the fisherman go out and get that first salmon and bring it in and cook it and they bring the bones back out there so the bones go back to the other salmon out there and say they treated 'em so well. So they end up having lots of salmon for the year. So this year they finally figured out what it was all about 'cause they actually came and told me. They were more proud of what they were doing and just having that understanding. (SHERRY – PARENT)

One elder explained that the First Salmon Ceremony practiced today is not exactly in the same form it was practiced in the past. Although she expressed some disappointment in the loss of the older forms, she seemed to understand that the changes were part of a necessary cultural renewal. While some traditions were maintained within families, some of these practices are now being re-introduced as community events and norms, demonstrating contemporary adaptations of traditional practices.

> I've noticed this is happening at a lot. Like when they have the Salmon Ceremony and they're giving back. [They're saying] thank you for giving us [life]. Before it was like only a family thing. Make sure you say, "thank you," you know. That's what we were taught. But now I see that a lot of the teachings…are becoming more normal now. (ROSE –ELDER)

In the steps tribal members take to reconnect and integrate original teachings into their lives, they open the possibility for traditional cultural health practices conducive to the promotion of cardiovascular health to return to their daily lives. Embedded within traditional cultural practices are values related to active physical engagement with the land or natural environment, improved nutrition (e.g., inclusion of salmon or other healthful traditional foods), spiritual practice, and increased sense of social cohesion and cultural pride. As elder Pearl says, the time is ripe for the return of old ways into the here and now:

> So, you know, there's all kinds of medicine, herbs out there for us. And I think that the time is going to come when we are going to have to go back to our old ways and learn. (PEARL – ELDER)

This elder suggests that effective approaches to addressing cardiovascular health may already exist in tribal communities and that revitalization of the "old ways" may be used to inform innovative prevention and intervention efforts. The acceptance and integration of traditional practices becomes one way to address and attenuate ambivalence in tribal members' relationships to land and health.

DISCUSSION

Interrupting Indigenous culture by removing people physically, spiritually, psychologically, and socially from their original lands is to remove them from their original tribal preventive and curative cardiovascular health behaviors. Deliberate historical policies aimed at genocide and assimilation into Western culture has made it difficult to reclaim original health practices centered on interaction with the land. This disruption and the resulting tension between what was and what is gives rise to great ambivalence, complicating tribal members' ability and motivation to make decisions related to diet, exercise, and cultural traditions that promote optimum cardiovascular health. Additionally, current Western prevention and intervention approaches to cardiovascular health have failed to address the more nuanced aspects of health risk behaviors including the role of historical trauma and resulting disruptions in traditional health practices and have done little to impact the overall CVD morbidity and mortality rates in AI/AN populations.

Tribal narratives from members of this Pacific Northwest tribe demonstrate that ambivalence is a noticeable effect of historical trauma and land displacement. This analysis focused on ambivalence as a precursor to revitalization of traditional cultural practices as expressed in tribal narratives. This analysis illustrated that despite its relationship to trauma and displacement, ambivalence provides an opportunity to collectively examine and identify healthy behaviors inherent in tribal customs. As the narratives moved toward identifying and adopting traditional cultural practices such as including traditional foods into diet as well as ceremony and ritual, ambivalence was attenuated. The stories became shared examples of tribally advocated behavior that adopt and adapt traditional cultural practices that have potential for improving cardiovascular health through integration of place-based cultural practices such as eating healthful traditional foods, increased physical activity through participation in traditional practices, practicing traditional ceremonies, and engaging multiple generations in sharing health knowledge.

Limitations

There are several limitations to the analysis reported in this paper**.** While the project completed 15 in-depth individual interviews, only 13 were usable, as 2 of the interviews were incomplete or left out the specific questions related to place/land and health. This small number of interviews reduces the variability in responses and consequently may have omitted important additional and/or alternative narratives. Additionally, the use of a purposive sampling strategy can impact the range and diversity of experiences represented in a sample as it focuses on recruiting individuals who provide specific knowledge and experience related to the research questions (Etikan, Musa, & Alkassim, 2015). While the participants may be “information-rich” (Etikan et al., 2015, p. 2), the nature of non-random sampling is subjective and may be a biased selection of participants, therefore may not be representative of the entire community. All of the participants were recruited by the Project Director/Tribal Liaison, and as such, all participants were known through the liaison’s professional and community connections which also may have impacted the type and variability of narratives included. Some people may have been missed who have entirely different experiences and worldviews. As this phase of the research focused on elders and parents, younger people were not represented in the sample, which may have obscured variability of narratives that exist amongst generational cohorts. These limitations could be addressed in future studies by including adolescents and young adults, and also increasing the number of parents and elders. Additional solution-oriented questions could be included to identify concrete sustainable cardiovascular health solutions for communities as an entry point for developing a community-based intervention pilot program.

Implications for Health and Promotion Practice

Western scientific approaches largely look toward individual-level behavior to explain and address CVD. Most recommendations are aimed at lifestyle and behavioral modifications including increased physical activity, dietary modifications, and possible use of anti-obesity pharmaceuticals (Wilson, Gilliland, Moore, & Acton, 2007). Rather than focus on individual-level behavioral changes and Western prescriptive health promotion models, some Indigenous scholars advocate for interventions that contextualize historical trauma while also integrating Indigenous knowledge and cultural practices into contemporary health interventions (Schultz, Cattaneo, et al., 2016; Schultz, Walters, Beltrán, Stroud, & Johnson-Jennings, 2016). For example, Yappalli – The Choctaw Road to Health project is an obesity and substance use risk prevention and health leadership program rooted in a curriculum based on traditional clan systems and includes re-walking portions of the Trail of Tears, the path of the Choctaw Nation of Oklahoma's forced removal. Revisiting the site of this historically traumatic event (forced removal from homelands) addresses grief and the legacy of removal on contemporary health disparities. Using a health leadership model based on traditional teachings, this project simultaneously addresses these legacies and their current impacts on tribal member health. Participating in this intervention encourages tribal members to craft their own innovative responses to obesity-related health conditions such as CVD.

Furthermore, health promotion and interventions to address CVD with AI/AN communities should consider approaches that focus on community-level (vs. individual-level) models of behavioral health change. An example of a community-level health promotion model can be seen in the Canoe Journeys of the Pacific Northwest. While primarily focused on substance use risk reduction, this annual event has emerged as a community-led effort to address healing and recovery of traditional cultural practices among the region's tribes. Participation in the Journey includes increased physical activity, attention to healthy behaviors, and revival and maintenance of traditional culture through building and pulling of the canoes. Canoes were vital for gathering food, social relationships, and for framing culture (Johansen, 2012). Similar to the Salmon Ceremony described by participants, this is an example of a community-level effort led by tribes with potential to affect CVD-related risk factors, such as diet and physical activity, as well as connect to traditional health behaviors that support cardiovascular health.

Findings from this study suggest that in addition to integrating Indigenous knowledge and practices into health promotion and intervention efforts, researchers and community members must attend to the tensions created by ambivalence that result from living with historical and contemporary traumas. Furthermore, those working to address cardiovascular health disparities among AI/AN communities must also address healing from the grief and ambivalence resulting from historical and contemporary traumas associated with loss of land and environmental destruction. Understanding complex experiences of historical traumas and the resulting disruption of relationships to place/land and health through tribal narratives reveals subtle nuances often expressed as ambivalence in adopting health behaviors that promote optimum cardiovascular health. Illuminating the ways that tribal members re-integrate traditional indigenous practices into contemporary contexts may offer cardiovascular health promotion models that are both culturally relevant and sustainable as they truly emanate from within tribal cultures.

REFERENCES

Amos, A., Wiltshire, S., Haw, S., & McNeill, A. (2006). Ambivalence and uncertainty: Experiences of and attitudes towards addiction and smoking cessation in the mid-to-late teens. *Health Education Research*, *21*(2), 181-191. http://dx.doi.org/10.1093/her/cyh054

Amoss, P. (1987). The Fish God Gave Us: The First Salmon Ceremony revived. *Arctic Anthropology*, *24*(1), 56-66. Retrieved from http://www.jstor.org/stable/40316132

Andrews, M., Squire, C., & Tamboukou, M. (Eds.). (2013). *Doing narrative research*. London: Sage.

Bassett, D., Buchwald, D., & Manson, S. (2014). Posttraumatic stress disorder and symptoms among American Indians and Alaska Natives: A review of the literature. *Social Psychiatry and Psychiatric Epidemiology*, *49*(3), 417–433. https://doi.org/10.1007/s00127-013-0759-y

Berger, M., & Sarnyai, Z. (2015). "More than skin deep": Stress neurobiology and mental health consequences of racial discrimination. *Stress*, *18*(1), 1-10. https://doi.org/10.3109/10253890.2014.989204

Bonow, R. O., Grant, A. O., & Jacobs, A. K. (2005). *The cardiovascular state of the union*. American Heart Association. Retrieved from http://circ.ahajournals.org/content/111/10/1205.short

Brave Heart, M. Y. H. (2003). The historical trauma response among natives and its relationship with substance abuse: A Lakota illustration. *Journal of Psychoactive Drugs*, *35*(1), 7-13. http://dx.doi.org/10.1080/02791072.2003.10399988

Brave Heart, M. Y. H. (1999). Oyate Ptayela: Rebuilding the Lakota Nation through addressing historical trauma among Lakota parents. *Journal of Human Behavior in the Social Environment*, *2*(1-2), 109-126. http://dx.doi.org/10.1300/J137v02n01_08

Brega, A. G., Noe, T., Loudhawk-Hedgepeth, C., Jim, D. M., Morse, B., Moore, K., & Manson, S. M. (2011). Cardiovascular knowledge among urban American Indians and Alaska Natives: First steps in addressing cardiovascular health. *Progress in Community Health Partnerships: Research, Education, and Action*, *5*(3), 273-279. https://doi.org/10.1353/cpr.2011.0042

Brody, G. H., Lei, M.-K., Chae, D. H., Yu, T., Kogan, S. M., & Beach, S. R. H. (2014). Perceived discrimination among African American adolescents and allostatic load: A longitudinal analysis with buffering effects. *Child Development*, *85*(3), 989–1002. https://doi.org/10.1111/cdev.12213

Brown, J. J. (2005). Fishing rights and the first salmon ceremony. In S. J. C. O'Brien (Ed). *American Indian Religious Traditions: AI* (Vol. 1). Santa Barbara: ABC-CLIO, Inc.

Cajete, G. (2000). *Native science: Natural laws of interdependence*. Santa Fe, NM: Clear Light Publishers.

Centers for Disease Control and Prevention. (2015). *American Indian and Alaska Native Heart Disease and Stroke Fact Sheet*. Retrieved from https://www.cdc.gov/dhdsp/data_statistics/fact_sheets/fs_aian.htm

Deloria, V. Jr. (1992). *God is red: A native view of religion* (2nd ed.). Colorado: North American Press.

Deloria, V. Jr. (1995). *Red earth, white lies.* New York: Harper and Row.

Duran, E., Duran, B., Brave Heart, M. Y. H., & Yellow Horse-Davis, S. (1998). Healing the American Indian soul wound. In Y. Danieli (Ed.), *The Plenum series on stress and coping. International handbook of multigenerational legacies of trauma* (pp. 341-354). New York: Plenum Press.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1-4. http://dx.doi.org/10.11648/j.ajtas.20160501.11

Evans-Campbell, T. (2008). Historical trauma in American Indian/Native Alaska communities: A multilevel framework for exploring impacts on individuals, families, and communities. *Journal of Interpersonal Violence, 23*(3), 316-338. https://doi.org/10.1177/0886260507312290

Evans-Campbell, T., & Walters, K. (2006). Catching our breath: A decolonizing framework for healing Indigenous peoples. In: R. Fong, R. McRoy & C. O. Hendricks (Eds.), *Intersecting child welfare, substance abuse, and family violence: Culturally competent approaches* (pp. 91-110). Alexandria, VA: Council on Social Work Education Press.

Ferreira, M. L. (2006). Love in colonial light: History of Yurok emotions in Northern California. In M. L. Ferreira & G.C. Lang (Eds.), *Indigenous peoples and diabetes: Community empowerment and wellness* (pp. 357-386). Durham, NC: Carolina Academic Press.

Harris, R., Nelson, L. A., Muller, C., & Buchwald, D. (2015). Stroke in American Indians and Alaska Natives: A Systematic Review. *American Journal of Public Health*, *105*(8), e16-26. https://doi.org/10.2105/AJPH.2015.302698

Heron, M. (2016). Deaths: Leading causes for 2014. *National Vital Statistics Reports*, *65*(5). Hyattsville, MD: National Center for Health Statistics. Retrieved from https://www.cdc.gov/nchs/data/nvsr/nvsr65/nvsr65_05.pdf

Hooks, G., & Smith, C. L. (2004). The treadmill of destruction: National sacrifice areas and Native Americans. *American Sociological Review*, *69*(4), 558–575. https://doi.org/10.1177/000312240406900405

Howard, B. V., Lee, E. T., Cowan, L. D., Devereux, R. B., Galloway, J. M., Go, O.T., … Welty, T. K. (1999). Rising tide of cardiovascular disease in American Indians. The Strong Heart Study. *Circulation*, *99*(18), 2389–2395. https://doi.org/10.1161/01.CIR.99.18.2389

Howard, B. V., Lee, E. T., Cowan, L. D., Fabsitz, R. R., Howard, W. J., Oopik, A.J., …. & Welty, T. K. (1995). Coronary heart disease prevalence and its relation to risk factors in American Indians. The Strong Heart Study. *American Journal of Epidemiology*, *142*(3), 254–268. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/7631630

Jamal, A., King, B. A., Neff, L. J., Whitmill, J., Babb, S. D., & Graffunder, C. M. (2016). Current cigarette smoking among adults — United States, 2005–2015. *MMWR. Morbidity and Mortality Weekly Reports*, 65, 1205-1211. Retrieved from https://www.cdc.gov/mmwr/volumes/65/wr/mm6544a2.htm?s_cid=mm6544a2_ww#suggestedcitation

Jervis, L., Beals, J., Croy, C., Klein, S., & Manson, S. (2006). Historical consciousness among two American Indian tribes. *The American Behavioral Scientist*, *50*(4), 526-549. https://doi.org/10.1177/0002764206294053

Johansen, B. (2012). Canoe journeys and cultural revival. *American Indian Culture and Research Journal*, *36*(2), 131-142. http://dx.doi.org/10.17953/aicr.36.2.w241221710101249

Krieger, N. (2012). Methods for the scientific study of discrimination and health: An ecosocial approach. *American Journal of Public Health, 102,* 936-944. http://dx.doi.org/10.2105/AJPH.2011.300544

Krohn, E., & Segrest, V. (2010). *Feeding the people, feeding the spirit: Revitalizing Northwest Coastal Indian food culture*. Centralia, WA: Gorham Printing.

LaDuke, W. (1999). *All our relations: Native struggles for land and life*. Cambridge, MA: South End Press.

Leonard, L. (1997). Sovereignty, self-determination, and environmental justice in the Mescalero Apache’s decision to store nuclear waste. *Boston College Environmental Affairs Law Review*, *24*, 651–693. Retrieved from http://lawdigitalcommons.bc.edu/cgi/viewcontent.cgi?article=1312&context=ealr

Libby, A. M., Orton, H. D., Novins, D. K., Beals, J., & Manson, S. M. (2005). Childhood physical and sexual abuse and subsequent depressive and anxiety disorders for two American Indian tribes. *Psychological Medicine, 35*(3), 329-340. http://dx.doi.org/10.1017/S0033291704003599

Lising, M. (1998). *Building healthy hearts for American Indians and Alaska Natives: A background report*. Washington, DC: National Institutes of Health, National Heart, Lung, and Blood Institute.

Luscher, K. (2002). Intergenerational ambivalence: Further steps in theory and research. *Journal of Marriage and Family, 64*(3), 585-593. http://dx.doi.org/10.1111/j.1741-3737.2002.00585.x

Miewald, C. (1995). The nutritional impacts of European contact on the Omaha: A continuing legacy. *Great Plains Research, 5*(1), 71-113. Retrieved from http://digitalcommons.unl.edu/greatplainsresearch/177?utm_source=digitalcommons.unl.edu%2Fgreatplainsresearch%2F177&utm_medium=PDF&utm_campaign=PDFCoverPages

Mischler, E. G. (1986). *Research interviewing: Context and narrative*. Cambridge, MA: Harvard University Press.

Moore, K., Jiang, L. H., Manson, S. M., Beals, J., Henderson, W., Pratte, K., … Roubideaux, Y. (2014). Case management to reduce cardiovascular disease risk in American Indians and Alaska Natives with diabetes: Results from the Special Diabetes Program for Indians Healthy Heart Demonstration Project. *American Journal of Public Health, 104*(11), E158–E164. http://dx.doi.org/10.2105/AJPH.2014.302108

Nelson, R. G., Sievers, M. L., Knowler, W. C., Swinburn, B. A., Pettitt, D. J., Saad, M. F., …. & Bennett, P. H. (1990). Low incidence of fatal coronary heart disease in Pima Indians despite high prevalence of non-insulin-dependent diabetes. *Circulation*, *81*(3), 987–995. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/2306842

Nies, J. (1996). *Native American history: A chronology of the vast achievements of a culture and their links to world events* (1st ed.). New York: Ballantine Books.

Pierotti, R., & Wildcat, D. (2000). Traditional ecological knowledge: The third alternative. *Ecological Applications, 10*(5), 1333-1340. Retrieved from http://www.jstor.org/stable/2641289?origin=JSTOR-pdf

Rajkumar, S., Fretts, A., Howard, B., Yeh, F., & Clark, M. (2017). The relationship between environmental tobacco smoke exposure and cardiovascular disease and the potential modifying effect of diet in a prospective cohort among American Indians: The Strong Heart Study. *International Journal of Environmental Research and Public Health*, *14*(5), 504. https://doi.org/10.3390/ijerph14050504

Reid, M., Burr, J., Williams, S., & Hammersley, R. (2008). Eating disorders patients' views on their disorders and on an outpatient service: A qualitative study. *Journal of Health Psychology*, *13*(7), 956-960. http://dx.doi.org/10.1177/1359105308095070

Rhoades, D. A. (2005). Racial misclassification and disparities in cardiovascular disease among American Indians and Alaska Natives. *Circulation, 111*, 1250-1256. Retrieved from http://circ.ahajournals.org/content/circulationaha/111/10/1250.full.pdf

Rhoades, D. A., Rhoades, E. R., & Welty, T. K. (2000). The rise of cardiovascular diseases. In E. R. Rhoades (Ed.) *American Indian health: Innovations in health care, promotion, and policy* (pp. 151-178). Baltimore: Johns Hopkins University Press.

Riley, T., & Hawe, P. (2005). Researching practice: I methodological case for narrative inquiry. *Health Education Research*, *20*(2), 226-236. http://dx.doi.org/10.1093/her/cyg122

Schultz, K., Cattaneo, L. B., Sabina, C., Brunner, L., Jackson, S., & Serrata, J. V. (2016). Key roles of community connectedness in healing from trauma. *Psychology of Violence, (6)*1, 42-48. http://dx.doi.org/10.1037/vio0000025

Schultz, K., Walters, K. L., Beltrán, R., Stroud, S., & Johnson-Jennings, M. (2016). "I'm stronger than I thought": Native women reconnecting to body, health, and place. *Health & Place*, *40*, 21-28. http://dx.doi.org/10.1016/j.healthplace.2016.05.001

Smith, S. L., & Frehner, B. (2010). *Indians & energy: Exploitation and opportunity in the American Southwest* (1st ed.). Santa Fe, NM: School for Advanced Research Press.

Sotero, M. M. (2006). A conceptual model of historical trauma: Implications for public health practice and research. *Journal of Health Disparities Research and Practice*, *1*, 93-108. Retrieved from https://ssrn.com/abstract=1350062

Spicer, P. (1997). Toward a (dys)functional anthropology of drinking: Ambivalence and the American Indian experience with alcohol. *Medical Anthropology Quarterly*, *11*(3), 306-323. http://dx.doi.org/10.1525/maq.1997.11.3.306

Stephens, C., Nettleton, C., Porter, J., Willis, R., & Clark, S. (2005). Indigenous peoples' health—why are they behind everyone, everywhere? *Lancet, 366*(9479), 10-13. http://dx.doi.org/10.1016/S0140-6736(05)66801-8

Swinomish Tribal Mental Health Project. (2002). Intergeneration trauma in the tribal community. In J. F. Clarke (Ed), *A gathering of wisdoms: Tribal mental: A cultural perspective, 2nd edition* (pp. 77-114). LaConner, WA: Swinomish Tribal Mental Health

Toussaint, D. W., VanDeMark, N. R., Silverstein, M., & Stone, E. (2009). Exploring factors related to readiness to change tobacco use for clients in substance abuse treatment. *Journal of Drug Issues*, *39*(2), 277-291. http://dx.doi.org/10.1177/002204260903900203

Thayer, Z., Barbosa-Leiker, C., Mcdonell, M., Nelson, L. A., Buchwald, D. S., & Manson, S. M. (2016). Early life trauma, post-traumatic stress disorder, and allostatic load in a sample of American Indian adults. *American Journal of Human Biology, 29*(3). https://doi.org/10.1002/ajhb.22943

Thayer, Z. M., Blair, I. V., Buchwald, D. S., & Manson, S. M. (2017). Racial discrimination associated with higher diastolic blood pressure in a sample of American Indian adults. *American Journal of Physical Anthropology*, *163*(1), 122-128. https://doi.org/10.1002/ajpa.23190

Thayer, Z. M., & Kuzawa, C. W. (2015). Ethnic discrimination predicts poor self-rated health and cortisol in pregnancy: Insights from New Zealand. *Social Science & Medicine*, *128*, 36–42. https://doi.org/10.1016/j.socscimed.2015.01.003

Thrush, C. (2000). *The Lushootseed peoples of Puget Sound country*. University of Washington Libraries Digital Initiatives Collection. Retrieved from http://content.lib.washington.edu/aipnw/thrush.html

Vickery, J., & Hunter, L. M. (2016). Native Americans: Where in environmental justice research? *Society & Natural Resources*, *29*(1), 36-52. https://doi.org/10.1080/08941920.2015.1045644

Wagner, J., Lampert, R., Tennen, H., & Feinn, R. (2015). Exposure to discrimination and heart rate variability reactivity to acute stress among women with diabetes: Racial discrimination and heart rate variability. *Stress and Health*, *31*(3), 255-262. https://doi.org/10.1002/smi.2542

Walters, K., Beltrán, R., Huh, D., & Evans-Campbell, T. (2011). Dis-Placement and Dis-Ease: Land, place, and health in American Indians and Alaska Natives. In: D. Takeuchi (Ed.), *Expanding the boundaries of place*. New York: Springer.

Walters, K. L., Mohammed, S. A., Evans-Campbell, T., Beltrán, R. E., Chae, D. H., & Duran, B. (2011). Bodies ’on't just tell stories, they tell histories: Embodiment of historical trauma among American Indians and Alaska Natives. *Du Bois Review: Social Science Research on Race, 8*(01), 179-189. http://dx.doi.org/10.1017/S1742058X1100018X

Weaver, H. N. (1999). Indigenous people and the social work profession: Defining culturally competent services. *Social Work, 44*(3), 217-225. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/10321132

Whitbeck, L. B., Adams, G. W., Hoyt, D. R., & Chen, X. (2004). Conceptualizing and measuring historical trauma among American Indian people. *American Journal of Community Psychology, 33*(3/4), 119-130. http://dx.doi.org/10.1023/B:AJCP.0000027000.77357.31

Wilson, C., Gilliland, S., Moore, K., & Acton, K. (2007). The epidemic of extreme obesity among American Indian and Alaska Native adults with diabetes. *Preventing Chronic Disease*, *4*(1), A06. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/17173714

Witmer, J. M., Hensel, M. R., Holck, P. S., Ammerman, A. S., & Will, J. C. (2004). Heart disease prevention for Alaska Native women: A review of pilot study findings. *Journal of Women's Health*, *13*(5), 569-578. Retrieved from https://pdfs.semanticscholar.org/4961/bde66a98521146df6fe3429c3df25ed81c47.pdf

Yuan, Y., Eaves, E. R., Koss, M. P., Polacca, M., Bletzer, K., & Goldman, D. (2010). "Alcohol is something that been with us like a common cold": Community perceptions of American Indian drinking. *Substance Use & Misuse*, *45*(12), 1909-1929. http://dx.doi.org/10.3109/10826081003682115

FUNDING INFORMATION

This work was supported by a cooperative agreement between the National Heart, Lung, and Blood Institute (NHLBI) and the Indigenous Wellness Research Institute, University of Washington School of Social Work, and a subcontract with the Northwest Tribal partner (U01-HL 087322). Additional support was provided by the National Institute On Minority Health and Health Disparities of the National Institutes of Health (P60MD006909). Additional support for this manuscript was provided by the National Institute of Mental Health of the National Institutes of Health (T32MH01996). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

ACKNOWLEDGEMENTS

We extend our gratitude to Dr. June LaMarr and community member Sheryl Fryberg for their leadership in this study. We also give thanks to Marina Benally for her support and guidance. Finally, we honor all of the tribal members who welcomed us into their spaces and shared their time, experiences, and knowledges. We are deeply humbled by your voices and your demonstration of resilience, humor, and grace. Thank you for sharing your stories with us.

AUTHOR INFORMATION

Dr. Ramona Beltrán (Mexica/Yaqui) is an assistant professor at the University of Denver Graduate School of Social Work.

Dr. Katie Schultz (Choctaw Nation of Oklahoma) is an assistant professor at the University of Michigan School of Social Work.

Angela R. Fernandez (Menominee) is a doctoral candidate at the University of Washington School of Social Work.

Dr. Karina L. Walters (Choctaw Nation of Oklahoma) is a co-director at the Indigenous Wellness Research Institute as well as an Associate Dean for Research and Katherine Chambers Hall University Scholar at the University of Washington School of Social Work.

Dr. Bonnie Duran (Opelousa/Coushatta) is director of the Indigenous Wellness Research Institute Center for Indigenous Health Research and a professor at the University of Washington School of Social Work

Dr. Tessa Evans-Campbell (Snohomish Tribe) is a co-director at the Indigenous Wellness Research Institute as well as the Associate Dean for Academic Affairs at the University of Washington School of Social Work.